FACTS & FIGURES

Chemistry & Materials Science Directorate 2001

Lawrence Livermore National Laboratory

UCRL-AR-129465-01

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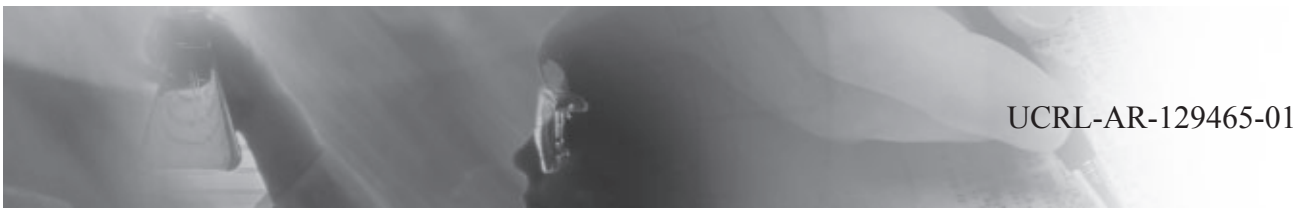

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FACTS & FIGURES

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Publication Date: February 2001

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Introduction

Facts & Figures contains a broad overview of budgetary, personnel and other administrative information about Lawrence Livermore National Laboratory (LLNL) and specifically the Chemistry and Materials Science (CMS) Directorate. For a more detailed, comprehensive overview of the Laboratory's mission, and expenditures, refer to the LLNL Institutional Plan @ http://www.llnl.gov/llnl/ip/

Mission

LLNL is a premier applied-science national security laboratory. Its primary mission is to ensure that the nation's nuclear weapons remain safe, secure, and reliable and to prevent the spread and use of nuclear weapons worldwide.

This mission enables Laboratory Programs in advanced defense technologies, energy, environment, biosciences, and basic science to apply their unique capabilities and to enhance the competencies needed for the national security mission.

The Laboratory serves as a resource to the U.S. government and a partner with industry and academia.

Vision and Goals

The Laboratory's goal is to apply the best science and technology to enhance the security and well being of the nation and to make the world a safer place.

Financial and FTE Highlights

Fiscal year ending September 30, 2000, operating and capital expenses totaled $1,332.3M. This included $1,041M for the Laboratory operating budgets and $291.3M for capital projects. FY01 operating and capital budgets are projected to be $1,397.3M. The staffing level as of September 30, 2000 was 7,227.5 full time equivalents (FTEs), including full-time, part-time, and indeterminate time employees. As of November 25, 2000, planned FTEs are 7,318.8. (See Table 1 for the correct breakdown of financial and FTE information by major program.) FTEs, a term used to describe a full-time employee who, during the course of a year, takes an average amount of vacation, sick leave, and other leave in addition to normal holiday leave. Therefore, FTE totals are not equivalent to number of employees.

Figures 1 and 2 show Operating costs and FTEs from FY91–00.

Staffing and Demographics

As of September 30, 2000, the LLNL workforce (by head count) was 8,535. This workforce is comprised of 86% career, approximately 1% non-career, 1% postdoctoral, 3% student, 2% retiree and 7% supplemental labor (see Table 2). The staff profile (for indefinite employees only) showed 40% scientific staff, 24% administrative and clerical, and 36% technical and crafts personnel. About 46% of the scientists and engineers have a PhD (see Table 3). Engineers/Patent Engineers make up the largest scientific job group (32%). The scientific staff by Discipline is shown along with Postdoctoral Labor (see Table 4).

Operations

Figure 3 shows the matrix system of management used to operate the Laboratory. The major functions "Program Directorates" are shown horizontally, and the "Program Support Directorates" are shown vertically to illustrate the matrix operation and cross-affiliation. Each Program organization is headed by an Associate Director (AD). The Service Organizations report through the Deputy Directors and include services such as Plant Operations, Controller, Legal Council, etc. Most of the support Directorate staff are assigned to work in one of the Programs, i.e., matrixed to a Program Directorate. Programmatic work assignments for an individual can change from time to time, but the administrative home tends to remain relatively constant.

Organization

No standardized organizational structure exists within the Program and Support Directorates. Each Directorate is organized by its AD to more efficiently meet the needs and mission of the organization (see Figure 4).

Table 1. *Laboratory Costs ($M) and FTEs by Major Program.*

Major Program	FY00 Actual 9/30/00		FY01 Planned 11/25/00	
	$(M)	FTEs	$(M)	FTEs
Operating				
Core Stockpile Stewardship	289.9	971.6	298.0	959.0
DP01-ASCI Platforms, Alliances & VIEWS	113.5	—	81.1	—
Stockpile Management	43.1	114.9	56.4	162.5
Safeguard & Security	—	—	74.4	463.1
Technology Transfer/CRADAs & Education	2.3	5.9	1.4	2.9
Inertial Confinement Fusion (ICF)	30.0	102.2	37.2	107.1
National Ignition Facility (NIF)	71.8	180.7	66.4	155.4
Fissile Material Disposition	24.3	54.5	23.9	55.8
Nonproliferation & Intelligence	92.0	237.5	97.9	234.9
Environ Restoration & Waste Mgmt (ERWM)	49.8	211.0	47.8	199.7
Other Defense	15.2	42.8	15.9	50.1
Magnetic Fusion Research (MFE)	15.1	53.3	13.6	46.9
Biomedical & Environmental Research	34.7	137.5	37.1	134.0
Basic Energy Sciences	11.9	25.8	12.9	35.9
Energy Research	10.9	34.5	12.7	39.5
WFDOE	83.7	289.2	88.1	268.7
Non-DOE	152.7	416.4	163.5	436.1
Total Sponsor Funded Operating	**1,041.0**	**2,877.8**	**1,128.3**	**3,351.6**
Capital				
DOE GPP	7.3	0.4	—	—
DOE Line-Item Construction	35.8	50.1	27.5	30.4
NIF Capital Construction	248.2	449.7	241.5	371.0
Total Sponsor Funded Capital	**291.3**	**500.2**	**269.1**	**401.4**
Total Sponsored Funded Operating & Capital	**1,332.3**	**3,378.0**	**1,397.3**	**3,753.0**
Distributed				
Laboratory Directed R&D (LDRD)	—	175.1	—	199.1
Plant Engineering (PE) Jobs	—	861.6	—	856.8
Organization Facility (OFC)	—	260.0	—	302.3
Organization Personnel (OPC)	—	613.9	—	607.2
Program Management (PMC)	—	417.9	—	379.3
Special Institutional Security Charge (SISC)	—	59.1	—	—
Institutional General Purpose Equipment (IGPE)	—	3.7	—	—
General & Administrative (G&A)	—	1,458.2	—	1,221.1
Total Distributed	**—**	**3,849.5**	**—**	**3,565.8**
Total Operating, Capital & Distributed	**1,332.3**	**7,227.5**	**1,397.3**	**7,318.8**

Minor variances may occur due to rounding.

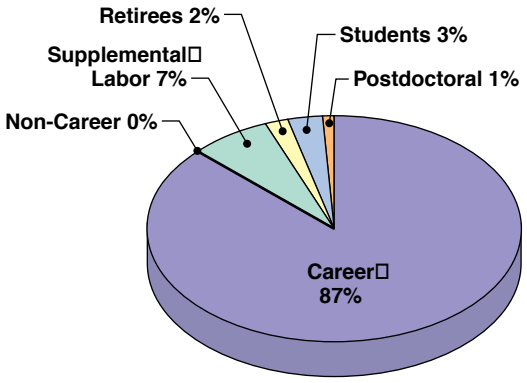


Table 2. *LLNL Workforce.*

Workforce Category	Heads	Staff%
Career	**7,382**	**86%**
Indefinite Full-Time	6,226	73%
Indefinite Part-Time	262	3%
Indeterminate	106	1%
Term Appointment Full-Time	736	9%
Term Appointment Part-Time	52	1%
Non-Career	**37**	**0%**
Temp	30	0%
Miscellaneous	7	0%
Total Career and Non-Career	**7,419**	**87%**
Other Labor	**526**	**6%**
Postdoctoral	116	1%
Retirees	165	2%
Students	245	3%
Other Labor Non-LLNL	**590**	**7%**
Supplemental Labor	590	7%
Total Other Labor	**1,116**	**13%**
Total Laboratory Heads	**8,535**	**100%**

Dated: September 30, 2000
Minor variances may occur due to rounding.

Table 3. *LLNL Staff Profile by Job Title and Degree Composition.*

Job Title	PhD	MS	BS	A A	No Degree	Total	Staff%
Scientists & Engineers	**1,218**	**747**	**636**	**7**	**29**	**2,637**	**40%**
Physicist—(270)	653	85	23	—	1	762	12%
Chemist—(242)	123	33	46	—	—	202	3%
Engineer/Patent Eng.—(168, 249)	262	374	241	3	12	892	14%
Mathematician/Computer Scientist —(256, 285)	98	197	270	3	16	584	9%
Biological Scientist—(225, 277, 235, 228, 221)	21	14	21	—	—	56	1%
Environmental Scientist—(230)	16	31	29	—	—	76	1%
Metallurgist—(265)	32	7	2	1	—	42	1%
M.D. (Staff)—(263)	5	1	—	—	—	6	0%
Political Scientist—(295)	8	5	4	—	—	17	0%
Administrative & Clerical	**32**	**168**	**325**	**133**	**898**	**1,556**	**24%**
Management—(196, 197)	18	54	33	2	12	119	2%
Professional—(163-165, 169, 170)	6	21	30	1	10	68	1%
Administrative—(100–162)	8	93	216	71	334	722	11%
Clerical/General Services—(400–462)	—	—	46	59	542	647	10%
Technical & Crafts	**1**	**31**	**311**	**671**	**1,386**	**2,400**	**36%**
Security/Fire Dept.—(051,	0	24	37	0	172,	234	4%6
Technical—(302-339,	1	303,	272	566	342	1,319	26%
Trades—(722–799, 805–990)—	—	—	15	67	367	449	7%
Facilities/OJT/Gen Help—(700,	—	—	—	38	5	43	1%
Degree Composit	19%	14%	19%	12%	35%	100%	

Includes Indefinite Employees
Minor variances may occ
Dated: September 30, 2000

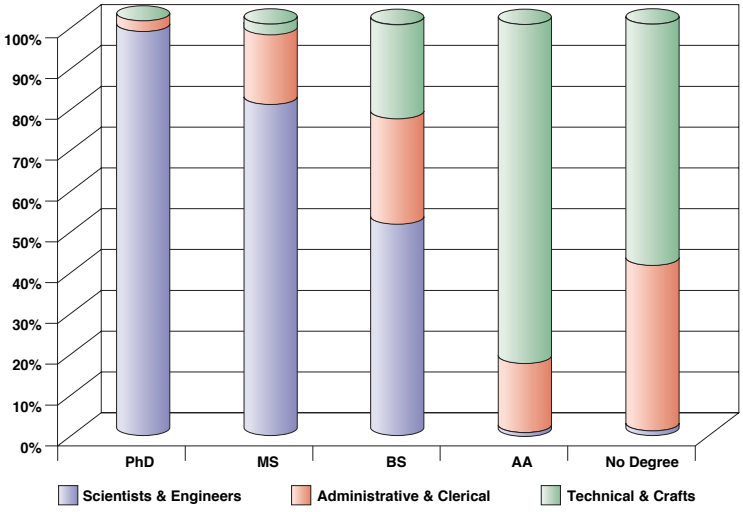
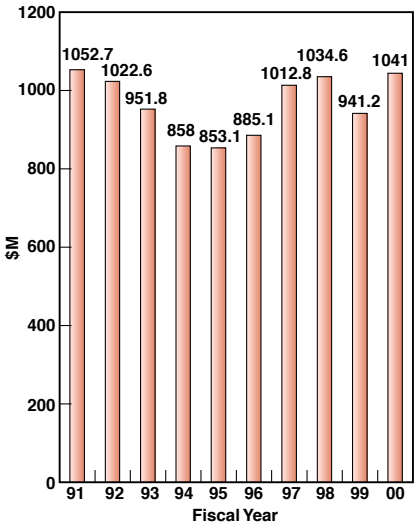


Figure 1. *Ten-Year Laboratory Operating Costs.*



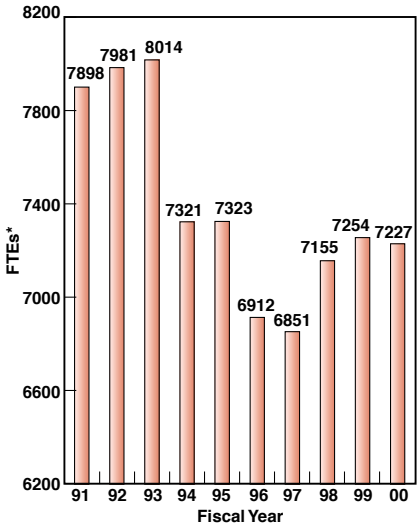


Figure 2. *Ten-Year Laboratory FTEs.*

Figure 3. *LLNL Organizational Matrix.*

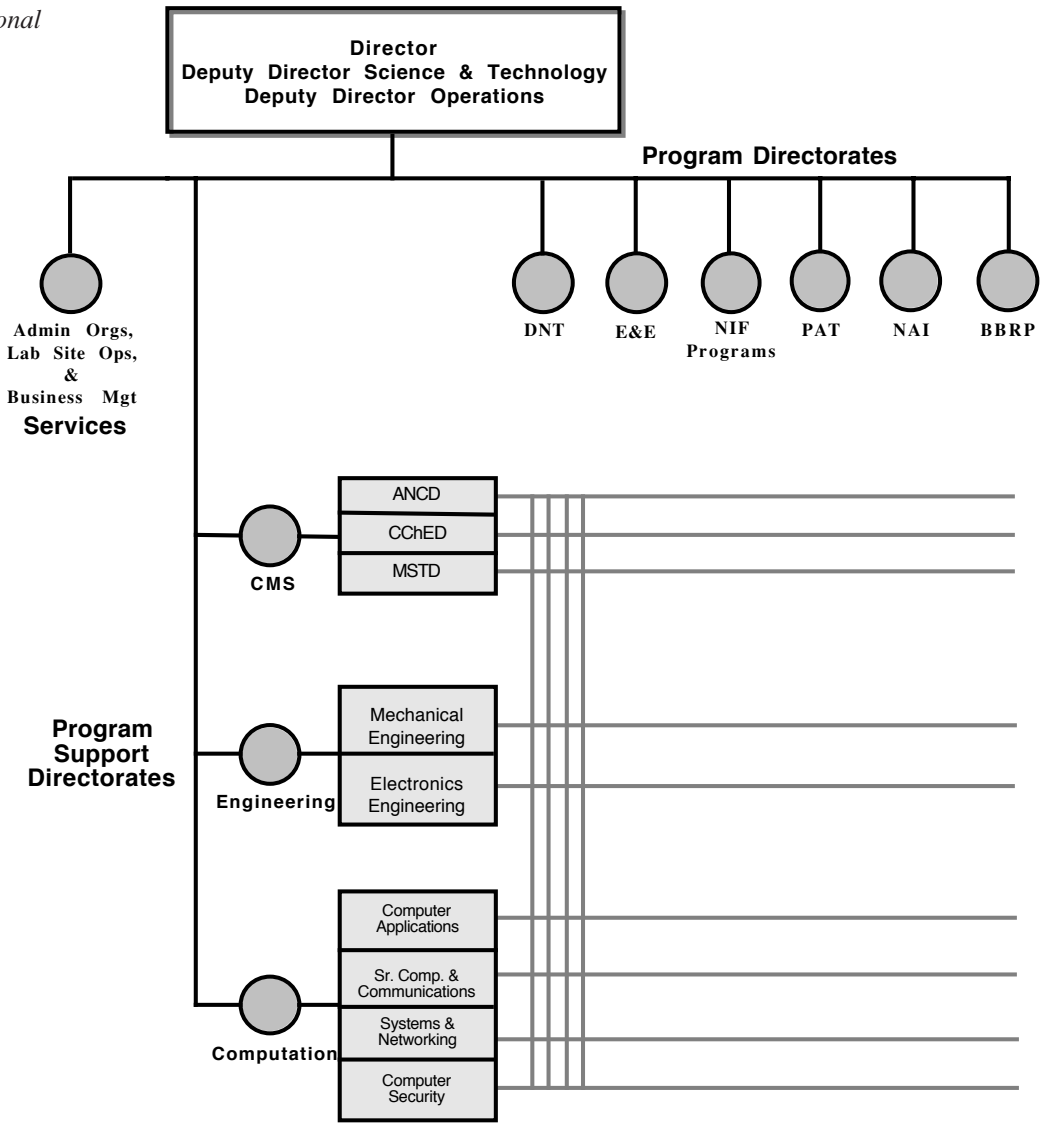


Table 4. *LLNL Scientists and Engineers by Discipline and Postdoctorals.*

Job Title	Total	Staff%
Scientists & Engineers	2,633	96%
Physicist—(270)	762	28%
Chemist—(242)	202	7%
Engineer/Patent Eng.—(168, 249)	889	32%
Mathematician/Computer Scientist—(256, 285)	583	21%
Biological Scientist—(225, 277, 235, 228, 221)	56	2%
Environmental Scientist—(230)	76	3%
Metallurgist—(265)	42	2%
M.D. (Staff)—(263)	6	0%
Political Scientist—(295)	17	1%
Postdoctorals	116	4%
Total Laboratory Heads	**2,749**	**100%**

Includes Indefinite & Postdoctoral Employees Only
Minor variances may occur due to rounding
Dated: September 30, 2000

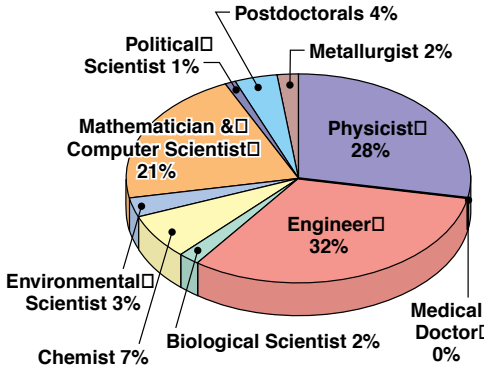
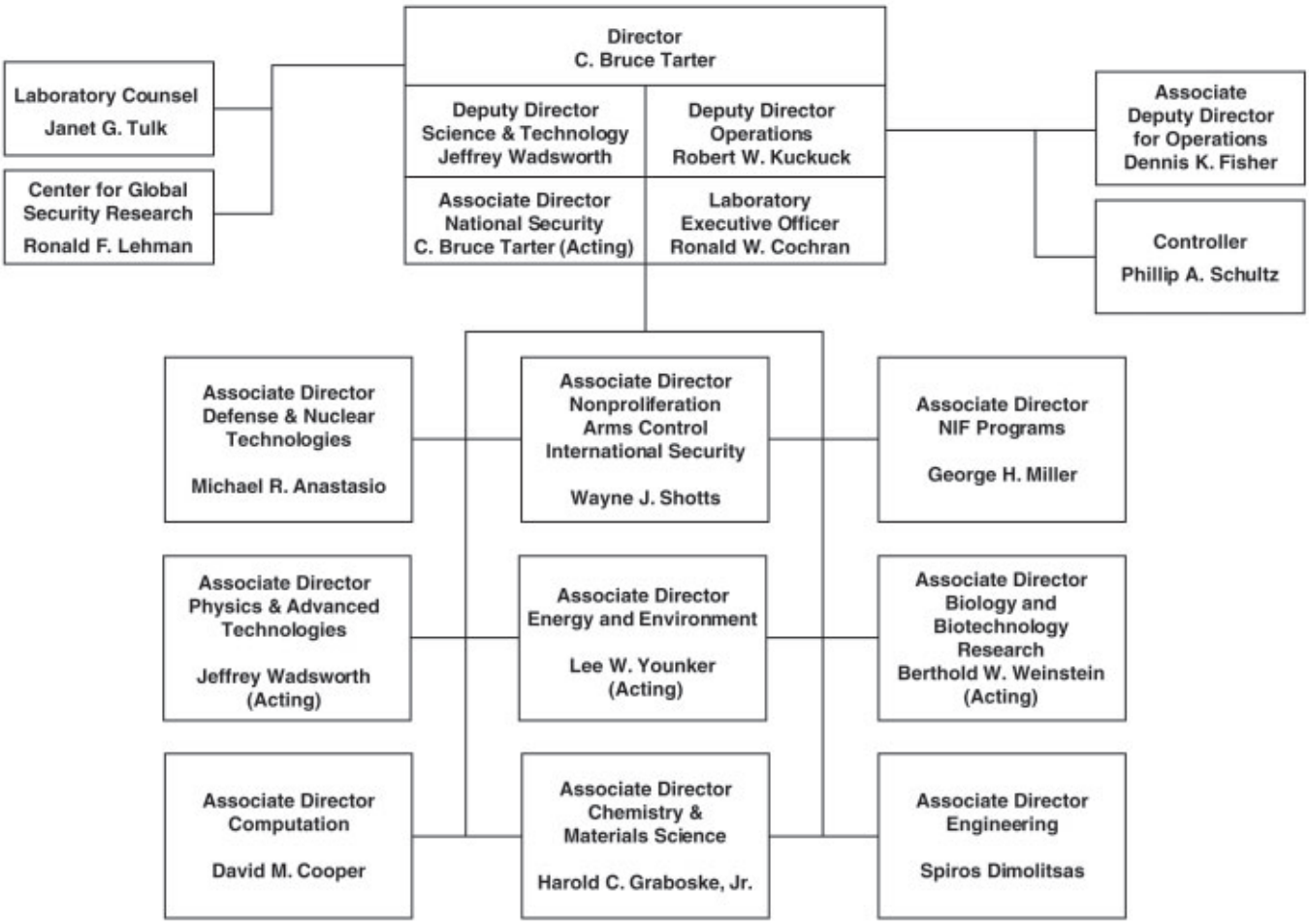


Figure 4. *LLNL Organizational Chart.*



Chemistry and Materials Science

History

Since the Laboratory's inception in 1952, Chemistry as a discipline has been identified as a separate organization. It has been called Chemistry Group, Chemistry Division, Chemistry Department, Chemistry and Materials Science Department, and since 1985, the Chemistry and Materials Science Directorate. Table 5 and Figure 5 outline the major changes in the Directorate from 1952 to the present.

Table 5. *Chronological History of CMS Directorate Management, 1952–present.*

Date	Chronology
1952	Chemistry Group reports to E. O. Lawrence through Herb York. 50 of the 308 FTEs at LLNL. Ken Street is the Department Head. Roger Batzel is the Assistant Department Head.
1956	Ken Street becomes DL, Chemistry, and also AD, UCRL-L (February 22, 1956 Administrative memo: Clarification of organizational structure at UCRL-L).
1959	Ken Street goes to UCB (returns in 1974 as AD for E&RP). Chemistry Division, under Roger Batzel, reports to Edward Teller.
1961	Roger Batzel named AD for Chemistry and Acting AD for Test (remains Department Head).
1966	Roger Batzel becomes AD for Chemistry and Space Reactor Program.
1967	Gus Dorough becomes Department Head of Chemistry.
1969	Roger Batzel becomes AD for Chemistry and Biomedical Research.
1971	Roger Batzel becomes LLNL Director. Jim Kane becomes Department Head of Chemistry.
1973	Gus Dorough becomes AD for Scientific Support (which included Chemistry and Computations). The Chemistry Department becomes the Chemistry and Materials Science Department.
1974	Jim Kane goes to Washington (he took a position as Technical Assistant to the General Manager, AEC in 1974; he later became head of Energy Research. In 1985, Kane was appointed Special Assistant for Laboratory Affairs, Office of the President, UC under Senior V.P. Bill Frazer). Jack Frazer becomes Chemistry Department Head.
1977	Radiochemistry Division moves to Nuclear Test Directorate and is renamed Nuclear Chemistry Division (under Chris Gatrousis).
1978	Charles Bender becomes Chemistry Department Head.
1982	Ken Street becomes Acting AD for Chemistry and Computations.
1983	Bob Borchers named AD for Computations. Computations no longer reports to AD for Chemistry.
1985	Chris Gatrousis becomes AD for Chemistry & Materials Science (CMS).
1994	Jeff Wadsworth becomes AD for CMS. Nuclear Chemistry Division is added to the CMS Directorate.
1996	Larry Newkirk becomes Acting AD for CMS.
1997	Hal Graboske becomes AD for CMS.

Vision

When CMS has achieved its vision, the Laboratory and its Programs will view CMS as a highly valued, relevant partner and as the pre-eminent partner of effective materials and chemistry solutions required to assure success of their missions. CMS will be the cornerstone of LLNL's nationally recognized excellence for material and chemical sciences to enable the Laboratory's Programs in achieving their mission in national security. CMS will have outstanding scientific, technical, operations and administrative staff with state-of-the-art research and facilities for long-term institutional excellence.

Operations

The scientific and technical discipline activities of the Directorate can be divided into three broad categories:

- CMS staff are assigned to work directly in a Program—a matrix assignment typically involving short deadlines and critical time schedules.
- The development, management and delivery of analytical, characterization, measurement, synthesis, processing and computing capabilities and scientific services to Programs.
- Longer-term research and development activities in technologies important to Laboratory Programs, determining the focus and direction of technology-based work on programmatic needs.

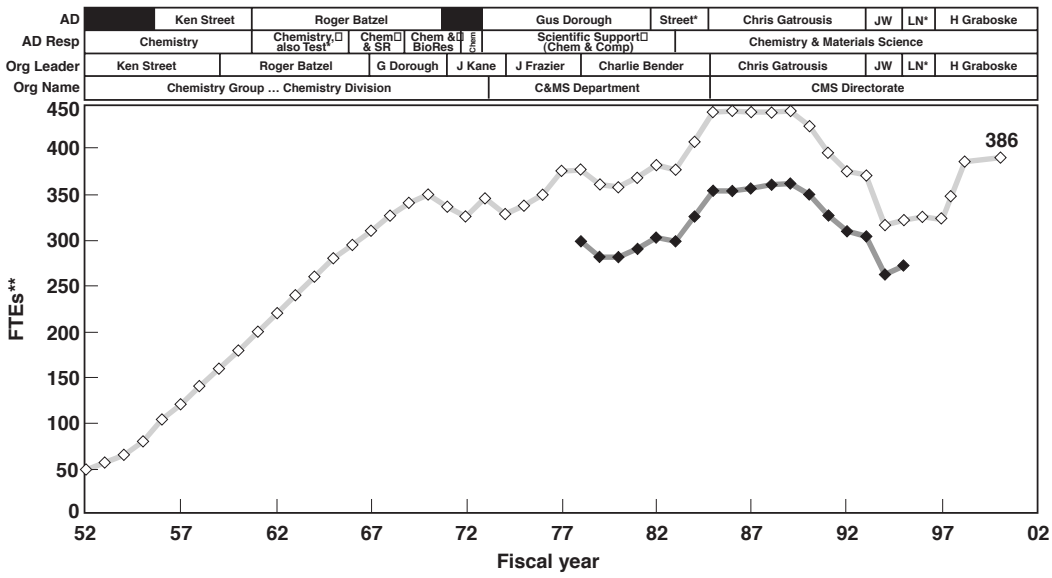


Figure 5. *CMS History.*

□ AD names Jeffrey Wadsworth (JW) and Lawrence Newkirk (LN)□
*□Acting□
**FTEs do not include Postdoctorals and Retirees□
From '78 to '95 the Analytical & Nuclear Chemistry Division (formerly CMS Isotope Sciences Division & Test Program Nuclear□
□ Chemistry Division) was transferred out

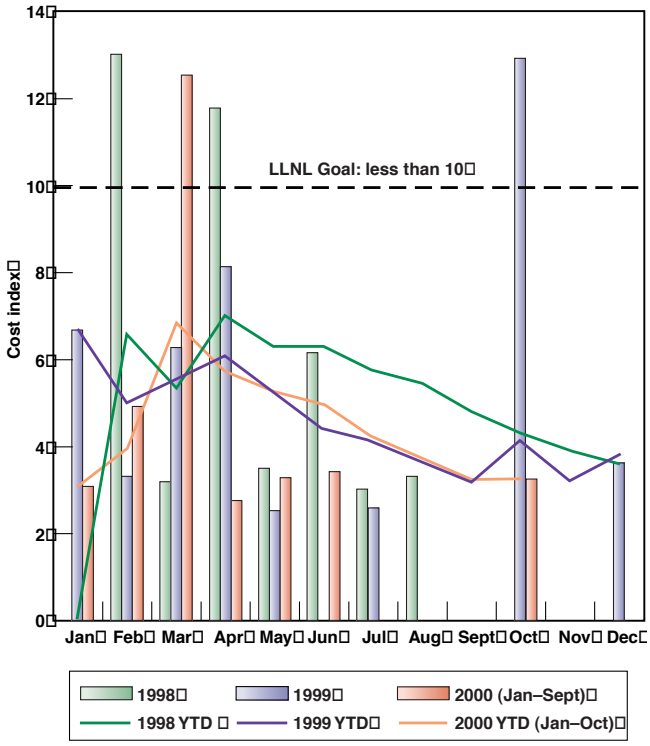
Integrated Safety Management System (ISMS)

CMS applies the LLNL Integrated Safety Management System (ISMS) to demonstratively integrate safety into all aspects of work planning and execution by incorporating the environmental, safety, and health (ES&H) requirements into these activities. The CMS ISMS *Implementation Plan* defines how the Directorate fulfills its responsibility to "do work safely."

A strong component of CMS' ISMS is its five Facility Safety Committees that address operations at Site 200 and Site 300. The Committees provide one mechanism for worker involvement and resolution of safety issues affecting research and work activities in the Directorate's facilities.

The result of these integrated activities has been improvements in CMS' safety record with fewer reportable injuries and lost/restricted work days. The Department of Energy (DOE) ES&H Cost Index is the primary metric used to track safety performance. The Index is a weighted score compiled of events such as reportable injuries, lost work days, restricted workdays, and total effort hours worked that allows for quick comparison of safety performance with other DOE sites. Figure 6 illustrates the improved trends over the past three years.

Figure 6. *CMS ES&H Cost Index: FY98–00 (Jan–Oct).*



Organization and Administration

The organization has evolved and expanded its technical breadth and depth over time focusing on a broad span of materials sciences (see Figure 7). It now houses the institutional focus on a broad base of chemical, analytical, and the materials sciences experimental and computational expertise and capabilities. The AD office includes Infrastructure activities that span the Directorate spectrum (e.g., functions such as administration, resource management, materials program leaders, facility operations, personnel, assurances, security, and computer support). Institute activities include the Glenn T. Seaborg Institute for Transactinium Science (GTS–ITS), Materials Research Institute (MRI), and the BioSecurity Support Laboratory (BSSL). The scientific and technical activities of the Directorate are conducted in the divisions.

The pages that follow provide summaries of the organization's key functions to include:

Infrastructrure Activities

- Operations
- Planning, Development and Personnel (PDP)
- CMS Assurance and Security Office

Institute Activities

- GTS–ITS
- MRI

Division Focus

- Analytical & Nuclear Chemistry (ANCD)
- Chemistry & Chemical Engineering (CChED)
- Materials Science & Technology (MSTD)

Program Focus

- Department of Defense (DoD) Technologies
- Energy and Environment
- Nonproliferation, Arms Control, International Security (NAI)
- National Ignition Facility (NIF)
- Stockpile Stewardship Management Program (SSMP)

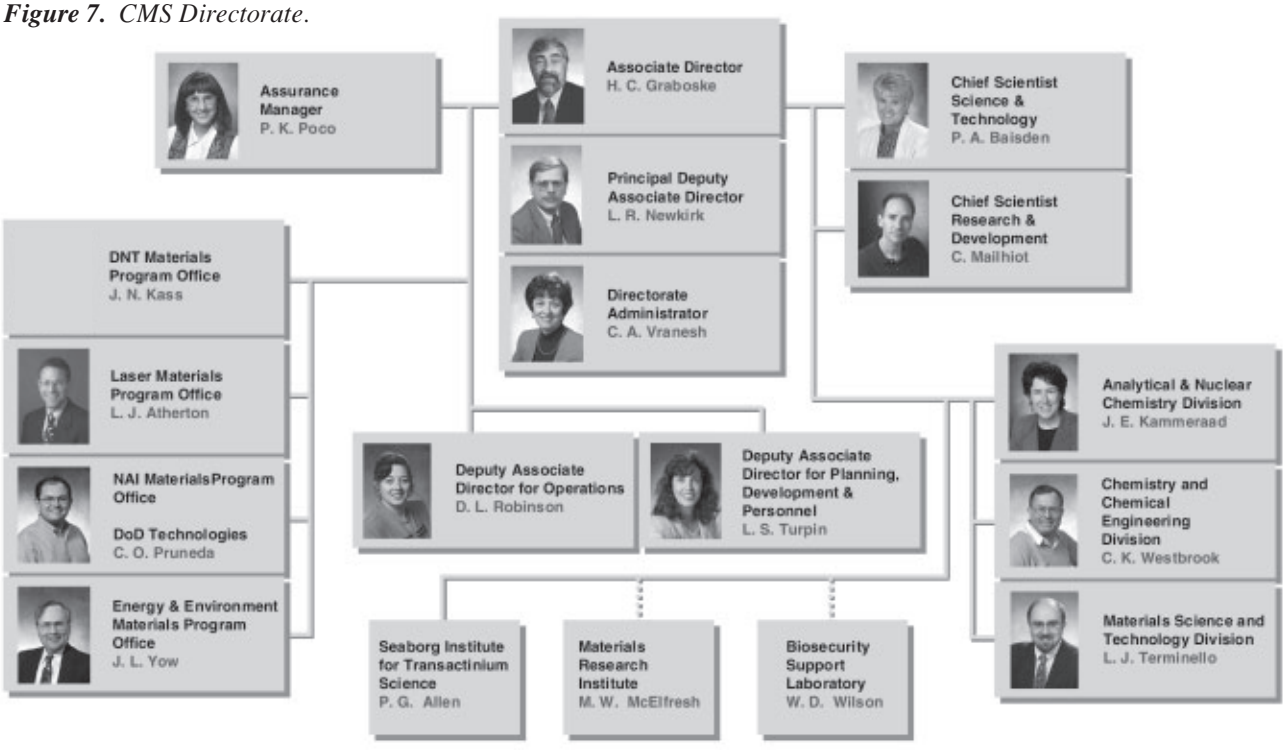
Capabilities Focus

- Materials Computation Analysis and Processing (MCAP) Program
- Space Action Team (SAT)

Mentoring Focus

- CMS Postdoctoral Program
- Undergraduate Summer Institute Program

Figure 7. *CMS Directorate.*



Infrastructure Activities

Operations—Denise L. Robinson, Deputy Associate Director

The CMS Operations Office provides leadership and management of the infrastructure activities neccessary to ensure a quality, cost-efficient workplace for the execution of scientific and technical activities. The Office manages facility, computer and business functions in support of CMS' mission (see Figure 8).

Facility Operations

Facility Management and Maintenance

- Management of physical structures, building systems and facility personnel.
- Facility utilities (LFC, electricity, common use and standard telephones).
- Facility services and consumables:
  —Industrial gases, labor support, copier rooms;
  —Vehicles, laboratory coats, property management, and conference capabilities.
- Facility Maintenance and Improvements:
  —CMS directed maintenance and modifications;
  —CMS laboratory moves and reconfiguration;
  —Capital construction.
- Facility safety teams.

Generation of Facility Authorization Basis and Documentation

- SARs, hazard analysis reports and authorization basis.
- FSP generation, review and publication.
- Envelope NEPA/EIB generation.
- Emergency preparedness and response plans.

Strategic Space Planning and Utilization

- Current and future needs of facilities.
- LLNL space and site planning interface.
- CMS program area plans (Institutional).
- Return of facilities to the Institution.

Space Use and Utilization Processes and Leadership

- Coordination of space assignments, maintenance of tracking systems, and office move support and execution.
- Laboratory/office transfers, room responsible person (RRP) assignments, maintenance of RRP database.
- Maintenance of billing information.

Computer Operations

Desktop support and network maintenance operations

- Mac, PC, UNIX, Desktop Support.
- Network installation, connectivity and maintenance.
- Server administration.
- Printer setup and service.
- Open Labnet connections.

Business Operations

Resource Management

- Budgeting (external proposals, indirect budgets).
- Cost analysis, tracking, and reporting.
- Account maintenance.
- Audit representation and management oversight.

Procurement Services

- Manage Technical Release Representatives (TRRs).
- Process credit card, blanket orders, requisitions.
- Provide online procurements through TRR Express.
- Storeroom maintenance.
- Provide access to excess equipment at federal sites.

Database/Web/Document Services

- Database development and maintenance.
- Directorate-wide Web development and maintenance.
- Technical editing.
- Graphic design and illustration.

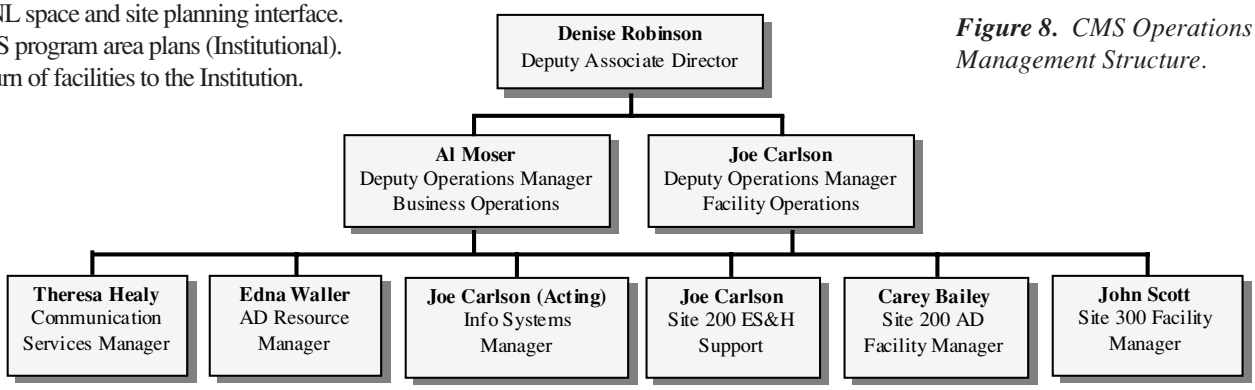


Figure 8. *CMS Operations Management Structure.*

Infrastructure Activities (cont'd)

Planning, Development and Personnel (PDP)—Lori S. Turpin, Deputy Associate Director

The Planning, Development and Personnel (PDP) Office directs organizational strategic planning and implementation, including the creation, development and operation of the long-term *Strategic Plan*, and the implementation of organizational structural Directorate changes required by key strategies. Figure 9 shows the PDP organizational structure.

This Office is responsible for staff development for the Directorate that includes the education and training requirements for all classifications in the Directorate.

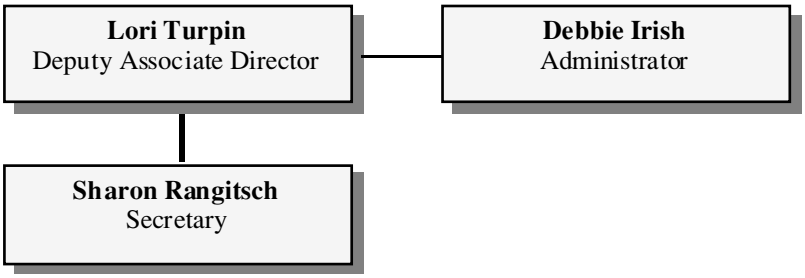
The Office is responsible for management of all Directorate personnel activities, including all aspects of the following:

- Performance management,
- Salary and compensation procedures,
- Recruiting,
- Hiring and placement, and
- All other personnel administrative activities.

The PDP Office is responsible for all Directorate Diversity and Affirmative Action initiatives and activities and for improving and expanding the nature and quality of communications within the Directorate.

The Office maintains appropriate knowledge of LLNL's ES&H standards, policies and procedures to identify hazardous conditions and operations, and takes appropriate action to correct or eliminate the hazard; and to assure appropriate procedures, training, equipment, warnings and tools are provided to employees.

Figure 9. *CMS PDP Organizational Structure.*



Infrastructure Activities (cont'd)

CMS Assurance and Security Office—Pamela Poco, Manager

The CMS Assurance and Security Office performs two functions: (1) to provide independent assurance of the implementation of ES&H requirements within CMS to the CMS AD; and (2) to facilitate, coordinate, and ensure implementation of security requirements within CMS.

CMS ES&H Assurance

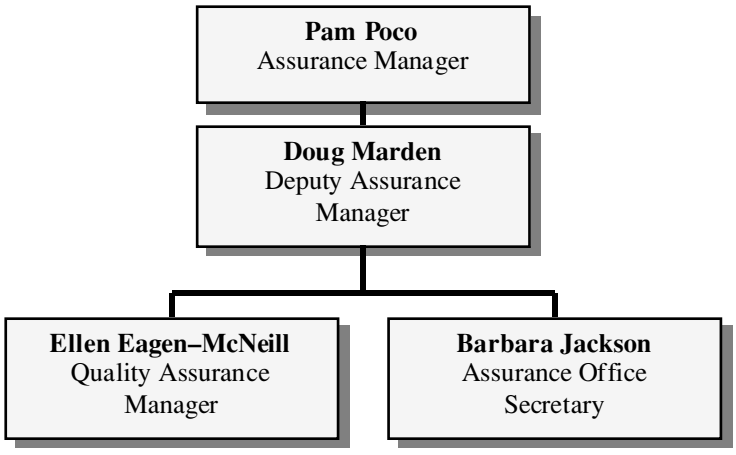
The mission of the Assurance Office is to promote a safe work place and to reduce the potential for public and personnel injury. The goals of this office are to do the following:

- Guide personnel in practices that maintain the integrity of Laboratory facilities and equipment and protect public property.
- Provide the AD with assurance that CMS operations are in compliance with applicable laws and policies.
- Favorably impact the ability of CMS Programs to meet their goals.
- Facilitate a healthy and knowledgeable ES&H culture.
- Improve the quality of ES&H programs and documents, including those developed at the institutional level.
- Encourage protection of the environment.

These goals are pursued by the organization shown in Figure 10. Their FY00 accomplishments include the following:

- Assisted CMS in preparing for, and successfully passing, ISMS Verification. This included playing a large role in the development of LLNL's ISM system.
- Reviewed and commented upon revisions of the hazard analysis and safety documentation for CMS facilities.
- Completed formal assessments or verifications of the following:
  —Fire Protection,
  —Integrated Safety Management,
  —Quantity/Distance Citing analysis,
  —Hazards Control's Facility Safety/ Authorization database for CMS facilities,
  —Use of Integration Work Sheets,
  —Annual Self-Assessment Report,
  —Occurrence Reporting, and the
  —Site 300 Chemistry Area Basis for Interim Operations.
- Acted as the Directorate point-of-contact for the collection and dissemination of information. Most notable of these efforts were the support provided to the following activities:
  —Waste generation estimates,
  —ES&H-related Lessons Learned,
  —National Emission Standards for Hazardous Air Pollutants accounting,
  —Storm Water Pollution Prevention certification,
  —Chronic Beryllium Disease Prevention Program,
  —Self-help for LLNL Emergency Management Division,
  —Coordination of inspections of particular interest to LLNL (e.g., inspection of compression fittings on radiological systems and inspection for suspect and counterfeit items),
  —CMS ES&H deficiency tracking database, and
  —University of California (UC) ES&H Performance Measures.
- Updated Directorate ES&H documents:
  —Directorate's Self-Assessment Plan,
  —Quality Assurance Plan,
  —Occurrence Reporting Plan, and
  —Visitor Safety Brochure and Registration process.

Figure 10. *CMS Assurance Office Organizational Structure.*



Infrastructure Activities (cont'd)

CMS Security

The CMS Security Office was created in June 2000 as a coalition of personnel supporting CMS that are associated with the various aspects of security. Table 6 lists the CMS Security Office participants. The efforts of this coalition are directed toward the following tasks:

- Facilitate communication among various branches of security and CMS personnel.
- Expedite the resolution of security issues, such as the processing of paperwork for foreign nationals, followup of security infractions, and responding to DOE security initiatives.
- Ensure implementation of security-related requirements within the various CMS management chains.
- Review and recommend approval of CMS security-related documents to the AD.
- Develop tools and procedures to expedite processing of security-related paperwork within CMS.
- Represent CMS interests on various institutional security-related committees:
  —Computer Security Council,
  —OpSec Committee,
  —Sensitive Subjects Committee,
  —Information Architecture Security Task Force, and
  —Computer Security Working Group.

Table 6. *List of CMS Security Office Participants.*

CMS Security Coordinator	Pam Poco
Classification	Robert Hopper
Computer Security	Joe Carlson
Foreign National Coordination	Deborah Irish
Personnel Security	Lori Turpin
Physical Security	David Johnstone
Sensitive Subjects	Al Moser

Institute Activities

Glenn T. Seaborg Institute for Transactinium Science (GTS–ITS)—Patrick Allen, Director

The ANCD also houses the Glenn T. Seaborg Institute for Transactinium Science (GTS–ITS) whose mission is to provide educational and research opportunities in transactinium science at all levels, including undergraduate, graduate and postdoctoral appointees. The focus of the Institute is to educate and train the next generation of scientists with the knowledge and expertise required to meet the nation's changing needs in the following areas: transactinium sciences, nuclear waste isolation, environmental protection and remediation, national security, nuclear surveillance, nuclear energy, and industrial application of nuclear methods. In the spring of FY00, Patrick Allen was chosen as the Interim Director of the Institute.

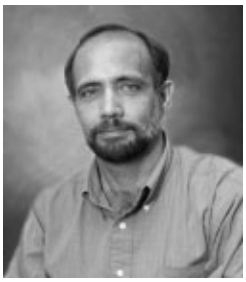
The mission of the GTS–ITS supports the long-term manpower and core competence needs of the defense-related and environmental programs at LLNL. The Institute hosts an annual Actinide Sciences Summer School Program (ASSSP) in partnership with the LLNL Education Office and the Department of Energy /Defense Program (DOE/DP). The intent of the ASSSP is to encourage students to pursue scientific careers in general, and to give them exposure to the actinide sciences so that they may consider careers in these fields that are at the heart of the DOE mission. The ASSSP builds on classroom education and offers "hands-on" laboratory research work with actinides. Many of the ASSSP students have attended the American Chemical Society sponsored summer schools in radiochemistry at either Brookhaven National Laboratory or San Jose State University. In addition, during the eight-week program, the students participate in short courses presented by leading professors and scientists in the field of actinide research. Poster presentations are given by each student on his or her ASSSP research project at the end of the summer program. LLNL staff, senior management and university professors are invited to attend this poster presentation session. During the summer of FY00, the ASSSP students participated in a variety of research projects that included:

- X-ray Absorption Spectroscopy,
- Theoretical Computational and Quantum Chemistry of Actinides,
- Modeling Migration at the NTS,
- Column Separation of Group 14 Element (114),
- Actinide Solubility at Elevated Temperature,
- Transmission Electron Microscopy of Aged Pu,
- Rapid Analysis for Actinides by Inductively Coupled Plasma (ICP)/Mass Spectrometry, and
- Migration Studies of Cs–137.

Over the past three years, 28 students have participated in the ASSSP. Some of these students have been hired into CMS as postdoctorate and technical scholars.

For further information on the GTS–ITS and the ASSSP please see our web site: http://www-cms.llnl.gov/gtsits/pages/welcome.html

Institute Activities (cont'd)



Materials Research Institute (MRI)—Michael W. McElfresh, Director

The Materials Research Institute was chartered in March 1997 as the Laboratory's newest Institute to promote the highest quality materials research and innovation through collaboration between universities and LLNL. Its main focus will be on projects that highlight and use the Laboratory's unique facilities and expertise—NOVA, the Electron Beam Ion Trap, the Positron Microprobe, and LLNL's high-pressure shockwave and diamond anvil cell facilities. The Institute's goal is to enable the best university research to enhance the Laboratory's programs in the areas of cutting-edge materials science.

The Institute will focus on three primary areas of materials research:

- Optical and electronic materials (laser materials and nonlinear optical materials, semiconductor devices, light emitting polymer structures, nanostructured materials, magnetic films);
- Metals and Organics [equation of state, mechanical properties, interfaces, grain boundaries, superplastics, high explosives (HE's)]; and
- Biomaterials (organic/inorganic interfaces, biostructures, biomemetic processes, biosensors, mutagenic compounds).

The overarching theme is science-based capability for prediction and control of materials properties. In addition to the three broad areas described above, the California Center for the Quantum Design and Synthesis of Novel Materials is an independent center within the Institute. This center is part of the UC's Campus-Lab-Collaboration Program. The research involves professors, students, and postdoctoral researchers from seven of the UC campuses working with LLNL staff to create and understand the properties of important novel materials.

Division Focus

Analytical & Nuclear Chemistry Division (ANCD)—Judy Kammeraad, Division Leader

The primary mission of the Analytical and Nuclear Chemistry Division (ANCD) is to support scientific and technical problem solving in the national interest, particularly in the programmatic mission areas that are central to the Laboratory. Figures 11–13 show ANCD staff working on various activities. Currently, most of the staff supports the following programs:

- Defense and Nuclear Technologies (DNT), including the Stockpile Stewardship Program;
- NAI;
- NIF Program; and
- Energy and Environment.

ANCD possesses a suite of scientific capabilities that are exercised to support programmatic problem solving. These include the following:

- Bioanalytical Mass Spectrometry,
- Inorganic Analytical Chemistry,
- Inorganic Mass Spectrometry,
- Isotope Geochemistry,
- Organic Analytical Chemistry,
- Nuclear Radiation Detection and Spectroscopy,
- Nuclear Properties of Actinides, and
- Radiochemistry.

ANCD scientific capabilities are expected to be practiced at state-of-the-art levels and ongoing capability development. Competitive institutional investment is available to insure that world-class research opportunities can be aggressively pursued, thereby assuring the scientific health of the practicing disciplines. Recent institutional investments have provided the best commercially available instrumentation in several areas to include: Fourier Transform Ion Cyclotron Resonance Mass Spectrometry, Glow Discharge Mass Spectrometry, Nuclear Magnetic Resonance, ICP Magnetic Sector Multicollector Mass Spectrometry, and Matrix-Assisted Laser Desorption Ionization Mass Spectrometry.

Figure 11(a&b). *Analytical chemists research and develop complex chemical separations to isolate and identify environmental contaminants and to aid waste management decisions.*

(a)

(b)

ANCD is building on the CMS long-range plan to continually improve its response to national needs. These planning activities include defining and nurturing scientific "thrust areas" in which to develop new capabilities and develop the next generation of young scientists. Recently we have begun applying and extending our capabilities into the biological arena, where they can impact problems in national security as well as in bioscience and healthcare.

Figure 12. *Expertise in the measurement of radioactive materials is applicable to a diverse spectrum of programmatic activities. These include assuring the viability of the U.S. nuclear stockpile, nuclear proliferation prevention, forensic science studies, and environmental security.*

(a)

Figure 13(a&b). *State-of-the-art mass spectrometry systems allow for the identification and quantification of ultra-trace levels of toxic materials.*

(b)

Division Focus (cont'd)

Chemistry & Chemical Engineering (CChED)—Charles Westbrook, Division Leader

The Chemistry & Chemical Engineering Division's (CChED's) primary mission is to support the Laboratory's programs. To accomplish this and to be recognized by the scientific community at large, five scientific disciplines have been identified and are being utilized to foster growth in science and technology. Each discipline has a leader who is responsible for the growth and development of that particular capability, in both the programmatic and technical areas. Key activities for each discipline are summarized as follows:

- **Chemical Engineering** is a fully-matrixed capability with staff involved in a number of high profile projects, including optics development and 3-omega damage for the National Ignition Facility (NIF). One of the growth areas for chemical engineers is in projects related to nonproliferation and counter-intelligence for the NAI Directorate.
- **Computational Chemistry** is rapidly becoming a central part of the research portfolio in CMS. *Computational chemistry of energetic materials* is investigating a number of areas including detonation or slower burning conditions, kinetics of high-energy density materials, and electronic structure computational modeling for high explosives. *Combustion chemistry* research within CChED deals primarily with ignition, flame propagation, quenching and emissions from internal combustion engines. Reaction mechanisms have been developed for fuels with as many as 8–10 carbon atoms, requiring extensive computational resources. *Computational chemistry of heavy elements* uses relativistic electronic structure techniques to study actinide element chemistry. *Chemical warfare agents modeling* is developing reaction mechanisms for systems similar to common chemical warfare (CW) agents. For example, CW agents molecular and atomic structure can be related to hydrocarbon molecules treated in the past in kinetic models.
- **Energetic Materials** is a key scientific, as well as a programmatic activity for CChED. Besides the aformentioned computational effort, activities in Energetic Materials include performance and aging testing, materials characterization (chemical, mechanical properties, thermodynamic, and equation-of-state), and synthetic organic chemistry. The Energetic Materials Center is a facility that is a unique cornerstone of CChED.
- **Chemical Synthesis and Processing** has the sol-gel and aerogel research and technology as its single largest component to the synthesis effort in CChED. However, it also has other capability building projects, including biosensor development, dendritic methodology for the development of new polymer systems and functionalized thiacrown ethers for waste remediation. New areas of investment include bio-related synthesis, organic and polymer materials aging and unique nanomaterials.
- **Physical Chemistry** has historically built a base of fundamental understanding of materials compatibility and chemistries through chemical optical spectroscopy. Key capabilities include optical spectroscopy, laser-induced chemistry and general photo-chemistry, data processing, molecular dynamics and kinetics.

The growth of these scientific capabilities is directly related to long-range programmatic technical needs, or facilitating the growth of new strategic opportunities. CChED will continue to improve its collaborations with the Laboratory programs, and continue to initiate scientific and technical capabilities for their future needs.

Division Focus (cont'd)

Materials Science & Technology Division—Lou Terminello, Division Leader

The Materials Science and Technology Division (MSTD) is a Division of about 135 scientists (75%) and scientific support (25%) personnel. It is organized into a number of program elements and scientific capabilities—a hybrid of program and discipline focus that reflects the numerous ways it serves the materials science needs of the Laboratory. Program elements are aligned with specific projects in DNT, Energy and Environment, NIF, and NAI. In general, MSTD is focused on metallurgy, ceramics, electrochemical processing, materials science, material characterization, surface science, solid-state chemistry, and materials theory and modeling. Its workforce is comprised of chemists, physicists, metallurgists, ceramicists, chemical engineers, materials scientists, and mechanical, chemical, and electrical technicians. This professional diversity and broad subject matter expertise makes MSTD a valuable component of an evolving Laboratory.

MSTD maintains expertise in the characterization and modeling of the mechanical properties of metals and in the development of relationships between microstructure and properties. This also includes experience with the mechanical properties of inorganic composite materials as well. The Joining element spans the entire range of metallic and non-metallic inorganic materials joining. Joining of exotic, toxic or hazardous materials is a specialty. The Ceramics capability is focused primarily on the fabrication of monolithic parts from ceramic powders using hot pressing, sintering, hot isostatic pressing or plasma spraying techniques. MSTD also maintains a well-equipped metallography laboratory which serves the needs of many programs.

Its Metals Processing capability has the ability to synthesize and process metals in a number of different ways. In metals processing, we can melt and cast experimental alloy compositions using vacuum induction melting and electron beam cold hearth melting; small quantities of material can be alloyed using an electron beam button melting furnace; material can be hot forged and hot and cold rolled; swaging and cold drawing are possible to provide wire and rod sample materials; materials can be shaped by hot forming, deep drawing and spin forming. Vacuum, inert gas and ambient heat treating capabilities are available to further control the physical properties of materials processed by the variety of hot and cold working processes. Room temperature and high temperature testing capabilities are available to characterize the physical properties of the test material.

Both Chemical Vapor Deposition (CVD) and Physical Vapor Deposition (PVD) facilities are available to fabricate shapes or provide surface coatings. These processes can provide shapes in hard to fabricate materials such as tungsten or provide surface coatings useful in providing corrosion, oxidation and wear resistant surfaces. We have a world recognized capability in multilayer fabrication for X-ray optics and other applications. A most recent accomplishment of this program was development of the optics for the TRACE X-ray telescope.

The Electrochemistry Capability can provide innovative solutions to a variety of problems, such as innovative battery concepts, waste treatment, refinement and extraction of metal from salts, a wide variety of electrochemical sensors, and the use of the bipolar cell for lithium metal recovery from lithium chloride. The development and study of corrosion technology uses MSTD's electrochemistry capability. Proper design of hardware and structures requires the understanding of the corrosion of materials, sometimes on a geological time scale as in the Yucca Mountain Program. Testing facilities are available to help assess and predict corrosion behavior.

A full suite of materials characterization capabilities is available, i.e., scanning electron microscopy, Auger spectroscopy, Rutherford backscattering and associated techniques using our 4 MeV ion accelerator, X-ray diffraction, atomic force microscopy, scanning tunneling microscopy, and various synchrotron based analytical methods. Recently, a new, state-of-the-art transmission electron microscope (TEM) was obtained jointly by CMS and DNT (see

Figure 14). We have fully instrumented, experimental surface science capability to carry out sample preparation, modification, characterization, including in-situ analytical measurements during transient behavior. Recent accomplishments of the materials characterization capabilities include detailed materials investigations for NIF laser optics. A precision bonding facility allows detailed investigation of interfaces between a wide range of materials. These capabilities support the dual mission of fundamental research and direct support of Laboratory programs. One example of the fundamental research produced by these capabilities lies in the nanoscience and technology areas of crystal growth, quantum confinement, and bio-inorganic interfaces.

MSTD has a world-class materials theory and modeling capability to calculate materials structure and properties over many length scales from quantum mechanics (total energies, magnetic, electronic, thermodynamic and transport properties), atomistic simulation applied to defects and diffusion in solids (radiation damage, ion implantation, dopant diffusion), phenomenalogical modeling of processes (metal working operations such as casting, welding, material failure such as crack propagation, fatigue) and other theoretical work. Our material modeling and theory capability is an essential tool for the Laboratory's programs and for our basic and applied research.

Figure 14. *A 300 keV Field Emission TEM with full high-resolution imaging and analytical capabilities.*

Program Focus

Department of Defense (DoD) Technologies—César O. Pruneda, Materials Program Leader

The objective of this office is to expand the CMS Directorate's portfolio of DoD projects and to coordinate non-DoD work-for-other (WFO) activities. The science and technology applied in the DoD and WFO projects serve to enhance and build CMS competencies that support Laboratory Programs in national security, energy and environment, and bioscience and healthcare. These Program development activities are performed and managed solely by CMS or collaboratively with other directorates and LLNL's DoD Programs Office. Another outcome of CMS DoD and WFO activities will be opportunities to develop and enhance the project leadership and management skills of CMS personnel.

The DoD Materials Technologies Leader Team includes CMS Division Leaders, Materials Program Leaders (MPLs), and key program element personnel.

CMS' current DoD and WFO portfolio is varied both in the level of funding of individual projects and range of sponsoring agencies, private and governmental.

Current DoD Technologies Office priorities include expanding programs in:

- Energetic materials synthesis, formulation, manufacturing, performance, vulnerability, reliability, storage, and demilitarization.
- All areas of chemical warfare/biological warfare (CW/BW): signatures, detection, analysis, mitigation, and demilitarization; activities in this arena will focus on identifying and engaging appropriate DoD elements collaboratively with CMS NAI MPL and NAI personnel.
- DoD environmental arenas where CMS and Energy and Environment directorates (and others) have unique capabilities that can be coupled collaboratively to address pressing national needs in these areas; activities in this arena are performed collaboratively with CMS Energy and Environment MPL (Jesse Yow) and personnel from other directorates.

Other priorities include working with the relevant CMS MPLs in identifying strategic directions and investments that can make an impact on DoD and WFO program development activities.

Program Focus (cont'd)

Energy & Environment—Jesse Yow, Materials Program Leader

The CMS Energy and Environment Materials Program Office (MPO) supports programs conducted by the Council for Energy and Environmental Systems (CEES), Energy and Environment Directorate, and Environmental Protection Department at LLNL. These programs work in three highly cross-linked and multidisciplinary areas at the intersection of U.S. energy, environment, and national security interests:

- Nuclear Materials and Systems, including:
  - —Repository systems for nuclear waste disposition;
  - —Nuclear materials management and stewardship;
  - —Complex engineered materials performance and simulation;
  - —Advanced systems for nuclear energy and proliferation resistant fuel cycles; and
  - —Nuclear systems safety and security.
- Energy/Carbon/Climate, including:
  - —Carbon utilization, separation, capture, and sequestration;
  - —Energy conversion, storage, and use;
  - —Fuel system and fuel additive modeling and assessment;
  - —Combustion kinetics and modeling; and
  - —Advanced and durable materials.
- Environmental Risk Reduction, including:
  - —Environmental monitoring and assessment;
  - —Remediation and waste management technologies;
  - —Critical energy and environmental infrastructure protection;
  - —Water resource characterization and diagnostics; and
  - —Multiscale (temporal and physical) atmospheric fate and transport.

CMS provides energy and environmental programs with about 40 FTEs of direct and indirect support, with people working in program and project leadership as well as support assignments. About 20 additional FTEs support these programs through recharged analytical services. The programs benefit from several LDRD projects that support energy and environmental interests:

- Resolving Nuclear Reactor Lifetime Extension Questions: A Combined Multiscale Modeling and Positron Characterization Approach (Brian Wirth).
- Development of a Solid Oxide Fuel Cell Stack Operating at Intermediate Temperatures (Quoc Pham).
- The Dependence of Reactivity of Carbon Electrochemical Fuels on Structure (Nerine Cherepy).
- Colloidal Transport of Actinides in the Vadose Zone (Annie Kersting).

Jesse Yow leads the CMS Energy and Environment MPO Team (see Table 7) that supports energy and environmental programs by:

- Providing a direct interface between the energy and environmental programs and CMS.
- Assisting energy and environmental organizations with strategic planning, new initiatives, and scientific review.
- Coordinating scientific and technical staffing for responsive support.
- Facilitating program access to CMS capabilities and facilities.
- Coordinating research and technology development to anticipate and meet program needs.

FY01 program development activities will focus on nuclear materials management and disposition, carbon fuel cycle and greenhouse gas management, energy storage and conversion technologies, atmospheric fate and transport, environmental security, environmental risk characterization and mitigation, and other areas determined by CEES and program investment strategies.

Table 7. *E&E MP Team members (others are added as needed).*

MPO Team Leader	Jesse Yow
Team Members:	Bryan Bandong
	John Cooper
	Dan Decman
	Glenn Fox
	Annie Kersting
	Wayne King
	Al Lingenfelter
	Cindy Palmer
	Quoc Pham
	Bill Pitz
	Dave Smith
	Steve Steward
	Lou Terminello
	Charles Westbrook

Program Focus (cont'd)

Nonproliferation, Arms Control, and International Security (NAI)—César O. Pruneda, Materials Program Leader

The NAI Directorate's mission is to support the U.S. government and international agencies in their efforts to reduce the danger from nuclear weapons and other threats from weapons of mass destruction.

The NAI MPO objective is to promote the success of NAI programs by facilitating NAI–CMS interactions, providing technical experts, coordinating collaborative research, assisting in program development, and building or enhancing key CMS capabilities.

Materials Program Liaison, César Pruneda, NAI MPO team [and interface] members are shown below in Table 8.

The total for CMS effort in NAI programs is approximately 40 FTEs of which about 30 are essentially full time in the NAI program elements:

- Forensic Sciences and other R-Division programs,
- Proliferation Prevention and Arms Control, and
- Counterproliferation Analysis and other Q-Division programs.

Current MPO priorities include the following:

- Identify areas for cooperative CW/BW program growth; team with key experts in NAI, Biology and Biotechnology Research Program (BBRP), Earth and Environmental Sciences (now part of Earth and Environment Directorate), and other directorates to pursue selected opportunities.
- Promote joint Laboratory Directed Research and Development (LDRD) projects in NAI-related research.
- Undertake the development of selected capabilities ("technology development") that aid NAI and other programs.
- Promote strategic investment of Institutional General Purposed Equipment (IGPE) funds to build CMS capabilities that aid NAI and other programs.
- Assist NAI in finding excellent chemical engineers for the Counterproliferation Analysis and Planning System (CAPS) program.
- Help NAI link and promote LLNL radiation detection experts and capabilities to benefit all of the programmatic and discipline stakeholders.
- Continue to aid the Forensic Science Center by providing technical experts, managing the matrix environment effectively, and promoting the enhancement of key technical capabilities.

MPO Team Liaison	César Pruneda
Team Members:	August Droege (Q and Z Divisions, Program Element Leader)
	Pat Grant (Forensic Science Center, Program Element Leader)
	Judy Kammeraad (Radiation Detection Center)
	Wayne Ruhter (PPAC, Program Element Leader)
	Chuck Stevens
	Dave Camp
	Dave Shoemaker
	Martyn Adamson
	Bill Wilson

Table 8. *NAI MPO Team (and interface) members.*

Program Focus (cont'd)

National Ignition Facility Program—L. Jeffrey Atherton, Materials Program Leader

The NIF will produce conditions where nuclear fusion reactions may be studied and materials tested at extreme temperatures and pressures. The CMS Directorate provides the NIF Program with about 40 FTEs of assigned matrix support. Chemists, physicists, materials scientists, and chemical engineers in CMS work in an integrated fashion to develop and field optical materials for high peak power lasers. Some examples include:

- Continuous melting technology for laser glass;
- Rapid crystal growth technology for KDP (potassium dihydrogen phosphate) see Figure 15;
- High-speed, deterministic polishing of fused silica lenses and windows;
- Diffractive optics fabrication for beam uniformity and color separation (see Figure 16);
- Fabrication of inertial fusion targets in support of energy research and defense programs;
- Precision cleaning and anti-reflection coatings for optical components.

The CMS Directorate provides resources for Technology Development activities that benefit multiple Programs. These science and technology projects are intended to provide benefits that enhance CMS' ability to be responsive to the needs of the Laboratory as a whole and enhance the value of CMS' disciplinary staff to the Programs.

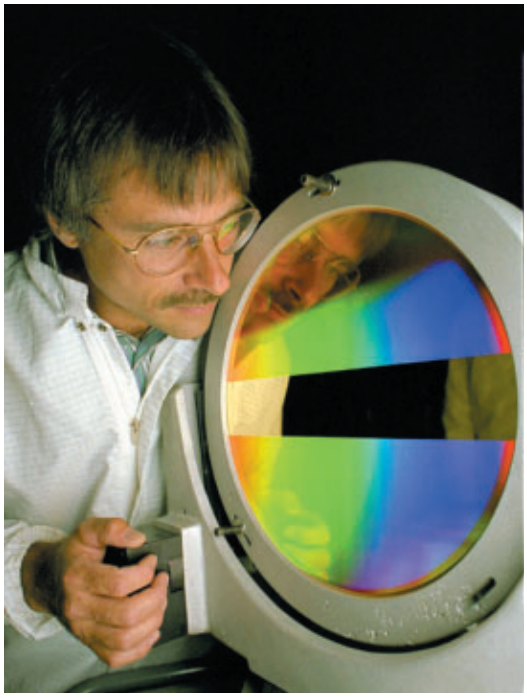


Figure 16. *Chemical engineer inspects a diffraction grating.*

Figure 15. *Rapid crystal growth technology produces large potassium phosphate crystals.*

Program Focus (cont'd)

Stockpile Stewardship Management Program (SSMP)—Jeffrey Kass, CMS Materials Program Leader

CMS supports many of the Stockpile Stewardship tasks and programs conducted by the Defense and Nuclear Technologies (DNT) Directorate. These tasks and programs enhance U.S. defense capabilities through innovative materials and chemical research and development (R&D) and the application of new science and technology to issues of concern to the U.S. Defense community. CMS assists all DNT organizations with strategic planning efforts as required, new program initiatives, and scientific reviews.

Program representatives are shown below in Table 9. The goals of the Office are extensive, including, but not limited to, the following:

- Provision of oversight and coordination for all CMS support to Stockpile Stewardship (A, B, and W Programs).
- Provision of the highest quality staffing and technical training for programmatic work.
- Planning and execution of R&D required for programmatic success.
- Assistance in identifying and providing required capital equipment.

Table 9. *SSMP MPO Team.*

MPO Team Leader	Jeffrey Kass
Program Reps:	Dick Lear, B-Program Dave Stanfel, A-Program Steve Root, W-Program
CMS Participants:	John Kolb (Deputy MPL and A-Program) Jim LeMay (Deputy MPL and Compatibility) Gil Gallegos (Pu/U and B-Program) Bill Wolfer (Modeling) Judy Kammeraad (Radchem) Ken Moody (Radchem) Jon Maienschein (HE) Randy Simpson (HE)

Keys in achieving these goals are assurance that laboratory and experimental activities are cost-effective and high-quality, providing suitable input to allow proper CMS staff administration and facilitation of effective two-way communications of program goals, issues, and progress.

CMS provides DNT programs with approximately 100 FTEs of assigned matrix support. The Nuclear Component Materials and Chemistry funding, Tech Base funding and LDRD tasks provide direct program support, reduction to practice and forward-looking research, respectively. The crucial Nuclear Component Materials and Chemistry area will expend roughly $8M during the current fiscal year. Due in large part to the growth of the overall funding level, the SSMP office has strengthened the coordination of CMS work internally as well as facilitated better communications. It has moved top people into crucial DNT assignments in HE, compatibility, Pu metallurgy, surveillance and radiochemistry.

Five focus areas of intense investigation under the Nuclear Component Materials and Chemistry umbrella that will continue to be investigated in FY01 are:

- Compatibility efforts,
- Direct system support,
- Accelerated aging efforts for Pu,
- Radiochemistry assessments, and
- HE safety/properties/retention of synthesis capability.

FY01 Technology Development projects related to SSMP interests include:

- HE shock physics,
- Pu shock physics, and
- Cross section studies.

Under the auspices of LDRD, the SSMP Office will:

- Investigate aging effects and defect structures in Pu,
- Experimentally validate theoretical interatomic potentials,
- Map enhanced nuclear stability in the heaviest elements,
- Investigate microstructure orientation effects on properties,
- Apply molecular dynamic calculations to HE safety, and
- Apply aerogel technology and synthesize new nanostructure HEs.

Capabilities Focus

Materials Computation, Analysis and Processing (MCAP) Program—Howard Hall, Program Leader

The MCAP mission is to focus on CMS core capabilities to solve key LLNL materials problems. As its primary responsibility, MCAP strategically manages and invests in CMS scientific capabilities to sustain and enhance their value to the Laboratory's mission and programs. MCAP committee members represent the three divisions within CMS, with Howard Hall as Program Leader. MCAP was implemented in FY98 as CMS' Strategic New Initiative with Louis J. Terminello as Program Leader.

Major FY00 Accomplishments

- Managed $1.6M of Institutional General Purpose Equipment (IGPE) investment in CMS capabilities.
- Transitioned human capability investments concepts to the "Tech Development" construct.
- Managed and oversaw the retirement of the Analytical Science Research and Support recharge, assisting staff in redeploying to programs and ending the unsupported "corporate" analytical capability at LLNL.

Continued implementation of CMS recharge service centers to one Directorate-wide service center. Buffered the extreme oscillations in demand and funding resulting from the LLNL-wide decision to redirect resources to NIF.

FY00 IGPE Investments

- Aerosol Time-of-Flight–Mass Spectrometer,
- MALDI– Time-of-Flight Mass Spectrometer,
- FTIR/Ramon Microscope,
- Low Background GAB Counters,
- Fourier Transform Mass Spectrometer (FTMS), and
- Agilent Technology HP6890 Gas Chromatograph and Agilent Technology HP1100 Liquid Chromatograph.

FY01 Strategic Actions

- Continue improving MCAP business practices,
- Enhance customer satisfaction, and
- Continue developing formalized MCAP investment strategies that map onto CMS strategic vision.

Capabilities Focus (cont'd)

Space Action Team (SAT)—Mitch Waterman, Program Leader

The Space Action Team (SAT) is an integrated multidiscipline, multi-directorate, cross-trained team of diverse talents and skills dedicated to safely, economically, and efficiently plan and execute facility projects to support Laboratory missions. The team's functional capabilities comprise Hazardous Waste Management (HWM), ES&H technicians, and craft support, teamed with professional ES&H disciplines.

SAT's primary objective is to work in partnership with its customers to support facility-related issues and concerns that impact their research activities. SAT uses a cradle-to-grave process to achieve this, working hand-in-hand with its customers to define and execute their projects. The team's staffing configuration is designed to implement moderate to high-risk facility projects. FY00–01 project categories include:

- Decontamination and demolition of perchloric/beryllium contaminated exhaust systems.
- Decontamination and demolition of eleven Laboratory surplused R&D facilities.
- Planning and execution of over 200 programmatic research relocation and/or disposal activities (e.g., wet chemistry labs, physics labs, surplus low-level waste).
- Supporting division-level organizations in their migration—jointly accomplishing the following:
  —colocation of functional groups to enhance collaborative research activities,
  —lowering operating costs and enhanced facility capabilities,
  —coordinating more efficient use of space, and
  —releasing and disposing nonessential surplus contaminated equipment and property.

SAT, based in the CMS Directorate, operates as a service organization and supports clients throughout the Laboratory. SAT's methodology is outlined in the site-wide Operating Safety Procedures (OSPs) developed specifically for the team's unique operations and missions. SAT's organizational chart is at the end of this document.

Mentoring Focus

CMS Postdoctoral Program—Glenn Fox, Program Leader

The CMS Postdoctoral Program gives the postdoctoral associates a broad and career enhancing experience, exposing them to a wide variety of research, facilities, and scientific staff. Historically, postdocs have had a difficult time integrating into the Laboratory's unique culture. Therefore, the Postdoctoral Program provides a resource for information, needs, and guidance in how to effectively navigate at LLNL. Tools added during FY00 continue to enhance the program:

- **New Employee Orientation (Quarterly)**—This presentation provides an overview of the history of LLNL, the role of its Programs, CMS, safety, security, and other informational resources useful for day-to-day activities. The presentation is also available on the internal CMS website.
- **Postdoctoral Symposium**—A series of talks and poster sessions given by the postdocs to highlight their research activities and capabilities.
- **Postdoctoral Social Events (Quarterly)**—The postdocs, mentors, and management meet during lunch to hear a guest speaker and to discuss concerns and current Laboratory and scientific events.
- **Monthly Postdoctorate Seminars**—The Program strongly emphasizes educating the postdoc staff about other programs and science around LLNL. The monthly seminar provides a variety of speakers (all CMS postdocs are required to present at least once during their tenure).
- **Greater Exposure to LLNL Facilities**—LLNL has research facilities and resources virtually unique to any other laboratory in the country. The Postdoctoral Program is facilitating interactions between CMS postdocs and these capabilities, providing points of contact and other needed information.
- **Enhance CMS' Research Profile and Portfolio**—This year, the Postdoctoral Program identified and hired several research associates in identified strategic CMS research areas to include: bio-mass spectroscopy, computational chemistry, and synthesis chemistry. Since postdocs are becoming better integrated into scientific and program projects, several of them will be transitioning to other support in the next year.
- **Cross-Directorate Collaborations**—The Postdoctoral Program is also beginning to collaborate with other directorates to find strategic personnel that can address areas of mutual interest. Also, utilization and interaction with the Lab-wide Lawrence Fellowship Program has located several high-quality postdoctoral appointees for CMS.
- **Enhance Contacts External to LLNL**—The continued goal is to improve current and future contacts (e.g., academia and other national laboratories). LLNL enhances its credentials and reputation as a world-class laboratory of science when a postdoc's tenure is a positive experience. A CMS postdoc hired in an academic or industrial atmosphere becomes a future source of talent and an unofficial representative of the Directorate.

Mentoring Focus (con'td)

Undergraduate Summer Institute Program—Charles Westbrook, Director

Annually, for two weeks in August, the Laboratory co-sponsors 30 outstanding science and engineering students entering their senior year at colleges and universities throughout the nation. The students attend lectures, tours, and conduct research projects under the guidance of leading UC faculty and LLNL researchers. The program is sponsored jointly by the Laboratory and the Fannie and John Hertz Foundation.

The Undergraduate Summer Institutes in Applied Science was founded in 1985 to provide participants a unique opportunity to develop an understanding of the basic principles and the state-of-the-art in applied science. The experience provides a rare, closeup look at how "big science" is performed.

The curriculum consists of lectures and projects in such areas as laser and magnetic fusion, free-electron lasers, laboratory x-ray lasers, computational modeling, surface and interface science, solid-state chemistry and physics, biomedical sciences, metallurgy, materials, precision engineering, neural networks and selected topics on national security.

CMS currently organizes and leads this program through CChED, providing staff research personnel a unique opportunity to work with these future scientists. In addition, this program offers an opportunity to interact with faculty at the universities where these students are undergraduates, strengthening the links between LLNL/CMS and its academic colleagues.

Directorate Awards

In November 1998, Laboratory Director, Bruce Tarter, authorized a pilot Directorate Awards Program to recognize one-time achievements that have notable impact on the Directorate or organizations and/or contribute to the pursuit of excellence at LLNL.

Programmatic contributions will be recognized by the Program Directorates through their awards program.

Awards categories for CMS are as follows:

- Scientific/Technical,
- ES&H,
- Leadership,
- Operations and Administration, and
- Institutional Impact.

Award Types and Criteria

Directorate Quarterly Awards

Quarterly awards are based on nominations received. Individuals or teams receive cash awards ranging from $75 to $1,000. The criteria includes:

- Significant scientific/technical accomplishment, breakthrough, or discovery.
- Outstanding and/or unusual creativity and/or initiative used in accomplishing work assignments, including problem definition and solution.
- Significant innovation by an individual or a team that contributes to progress towards the completion of a project milestone.
- Exemplary performance to an important organizational need.

Table 10 lists the FY00 recipients.

"Spot" Awards

The award includes memorabilia plus a certificate of recognition, which is distributed by senior managers. The criteria includes:

- Significant improvement of quality, efficiency, safety, and productivity in all categories.
- Administrative or management practices that have organizational effect.
- Outstanding achievements in support of CMS, Directorate goals or values (e.g., for community service, ES&H, cost cutting/enhanced efficiency, educational outreach, and diversity.

Recipient names are maintained by the Division Offices.

Table 10. *FY00 Directorate Award Recipients.*

Category	Title	Award Recipient(s)*
Leadership	Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere	Cynthia Palmer, Kevin Roberts, Annie Kersting, Robert Silva, Karyn Wilderson, Kim Hallock, Maureen Tortorelli[a]
Leadership	TEM Recharge Effort	Mark Wall[e]
Ops/Admin	Consolidation of Legacy Containers/Products/Chemicals in B222	Jay Dixon[e, f]
Scientific/ Technical	Publication of six Physical Review Letters on Fundamental Interaction of Highly Charged Ions and Surfaces	Thomas Schenkel[b]
ES&H	SST - Scientific Safety Team	Howard Hall[g]
ES&H	Rev. of ES&H Manual Supplement 21.14	John Reynolds[a]
Scientific/ Technical	R&D 100 Award "Waste Inspection Tomography"	Daniel Decman, De Lynn Clark, Patrick Roberson, Harry Martz, Dennis Goodman, Jesse Jackson, Erik Johansson, Stephen Azevedo[b]
Scientific/ Technical	Modification to ALE3D code	Albert L. Nichols[a]
Scientific/ Technical	Modeling of High Explosives Behavior	Larry Fried[a]
Scientific/ Technical	Contribution to fundamental studies of Plutonium	Mike Fluss[a]
Scientific/ Technical	Utilization of modern analytic technology-provided direct evidence for key mechanistic and kinetic data of solid-state reaction in 2 key weapons materials	Philip Miller, Joseph Menapace[a]
ES&H	Update of existing B132 N HAR required screening 13890 entries	Jim Fischer[a]
ES&H	CMS S/C Inspection Report	Roger W. Petersen[a]
ES&H	ISM Verification Readiness	Cory Wilkinson, Marlene Emig[a]
ES&H	CMS Safety Basis Documentation & FSP	Jim Fischer, Jerry Schweikert, John Scott, Pete Baylacq, Tom Felter, Doug Marden[a]
ES&H	Chemical Inventory Reduction	Terry, Duewer, Robert Reibold, Hugh Gregg, Ted Baumann, Glenn Fox[a]
ES&H	SAT Team Response	Mitch Waterman[a]
ES&H	Work Area Cleanup	Mo Bissani, Mitch Moffett, Barney Hernandez, Bob Burrows, Darrin Valentine, Mark Ludwig, Mark Johnson, Mark Evans[a]
ES&H	Director's ISM Awards for Outstanding Contributions towards the success of the ISM Verification	Ellen Eagan-McNeill, Marlene Emig, Doug Marden, Carey Bailey, Karen Dodson, John Scott, Howard Hall, Kevin Roberts, Corey Wilkinson, Barbara Jackson[a]
Leadership	CChED Morale Officer	John Reynolds[b]
Ops/Admin	Exceptional productivity in CAS duties	Melina Manipis, Helen Meredith, Leslie Spellman[a]
Ops/Admin	Performing two Resource Managers job duties	Theresa Healy[a]
Ops/Admin	Performing two Division Administrator job duties	Karen Jautaikis[a]

*[a]Significant outstanding contributions beyond the scope of normal job assignments
[b]Exceptional creativity in the achievement of a project or assignment
[c]Exemplary teamwork
[d]Exceptional customer service well beyond normal expectations
[e]Extraordinary productivity
[f]Achievement of process improvements resulting in greater efficiency and/or cost savings
[g]Extraordinary commitment and effort to enhance ES&H awareness and effectiveness

CMS Core Strategies

The CMS Core Strategies focus around five key subject areas:

- **Science and Technology Focus**—to create an integrated and balanced research portfolio and increase collaborations and visibility with potential funders.
- **Program Focus**—to create organizational design/plans to focus on program interactions.
- **Workforce and Leadership Focus**—to develop a workforce and leaders to conduct CMS' mission.
- **Scientific Capabilities and Infrastructure Focus**—to identify and enhance key capabilities for staffing; facilities, equipment and instrumentation; and enable the processes in business, ES&H, security, and Integrated Safety Management.
- **Institutional and External Focus**—to increase CMS' participation in institutional planning, management and infrastructure; and expand CMS' role and influence in external scientific communities.

Staffing and Demographics

As of September 30, 2000, the CMS workforce (by head count) was 456. This workforce is comprised of 88% career, 0% non-career, 6% postdoctoral, 2% retiree, 2% student, and 2% supplemental labor (see Table 11). Table 12 shows staff profile and degree composition for career employees (by head count) is 400. The staffing breakdown is 70% scientists and engineers, 19% technicians, and 11% administrative and clerical.

The breakdown within the scientific and engineering disciplines is 17% physicists, 48% chemists, 15% engineers, and 10% metallurgists. About 66% of the scientists and engineers in CMS have a PhD.

The scientific staff by Discipline is shown along with postdoctoral labor in Table 13.

A discipline staff profile spanning ten years is shown in Table 14.

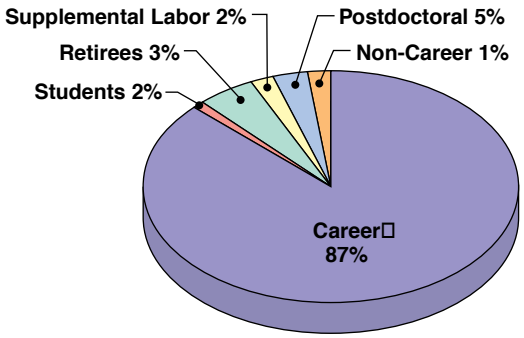


Table 11. *CMS Workforce.*

Workforce Category	Heads	Staff%
Career	**400**	**88%**
Indefinite Full-Time	329	72%
Indefinite Part-Time	13	3%
Indeterminate	6	1%
Term Appointment Full-Time	48	11%
Term Appointment Part-Time	4	1%
Non-Career	**2**	**0%**
Temp	2	0%
Misc.	—	0%
Total Career and Non-Career	**402**	**88%**
Other Labor	**45**	**10%**
Postdoctoral	25	5%
Retirees	10	2%
Students	10	2%
Other Labor Non-LLNL	**9**	**2%**
Supplemental Labor	9	2%
Total Other Labor	**54**	**12%**
Total Laboratory Heads	**456**	**100%**

Minor variances may occur due to rounding
Dated: September 30, 2000

Table 12. *CMS Staff Profile by Job Title and Degree Composition.*

Job Title	PhD	MS	BS	AA	No Degree	Total	Staff%
Scientists & Engineers	**184**	**35**	**60**	**–**	**1**	**280**	**70%**
Physicist—(270)	46	3	2	–	–	51	13%
Chemist—(242)	87	17	40	–	1	145	36%
Engineer/Patent Eng.—(168, 249)	24	10	12	–	–	46	12%
Mathematician/Computer Scientist—(256, 285)	–	–	1		–	1	0%
Biological Scientist—(225, 277, 235, 228, 221)	–	–	4	–	–	4	1%
Environmental Scientist—(230)	–	1		–	–	1	0%
Metallurgist—(265)	27	4	1	–	–	32	8%
Administrative & Clerical	**–**	**5**	**6**	**1**	**32**	**44**	**11%**
Management—(196, 197)		3	–	–	–	3	1%
Administrative—(100–162)	–	2	4	–	11	17	4%
Clerical/General Services—(400–462)	–	–	2	1	21	24	6%
Technical & Crafts	**–**	**1**	**17**	**23**	**35**	**76**	**19%**
Technical—(302–339, 393, 347–391, 502–588, 593)	–	1	17	23	35	76	19%
Total Laboratory Heads	**184**	**41**	**83**	**24**	**68**	**400**	**100%**
Degree Composition %	**46%**	**10%**	**21%**	**6%**	**17%**	**100%**	

Includes Career Employees Only
Dated: September 30, 2000

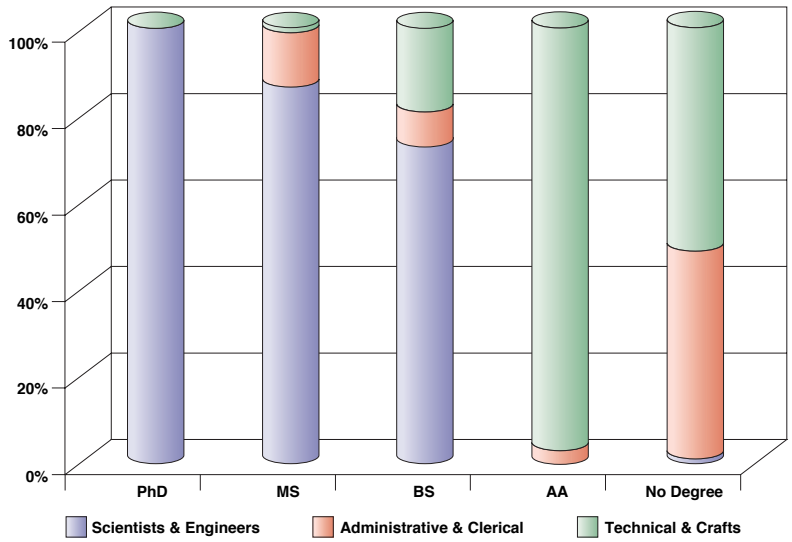


Table 13. *CMS Scientists and Engineers by Discipline and Postdoctorals.*

Job Title	Total	Staff%
Scientists & Engineers	280	92%
Physicist—(270)	51	17%
Chemist—(242)	145	48%
Engineer/Patent Eng.—(168, 249)	46	15%
Mathematician/Computer Scientist—(256, 285)	1	0%
Biological Scientist—(225, 277, 235, 228, 221)	4	1%
Environmental Scientist—(230)	1	0%
Metallurgist—(265)	32	10%
Postdoctorals	25	8%
Total Laboratory Heads	**305**	**100%**

Includes Career & Postdoctoral Employees Only
Minor variances may occur due to rounding
Dated: September 30, 2000

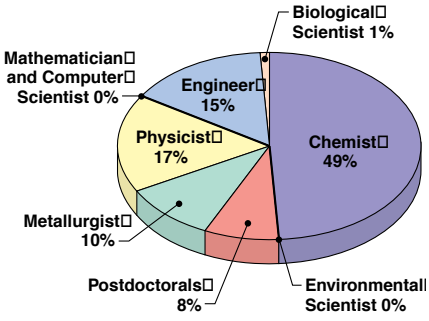
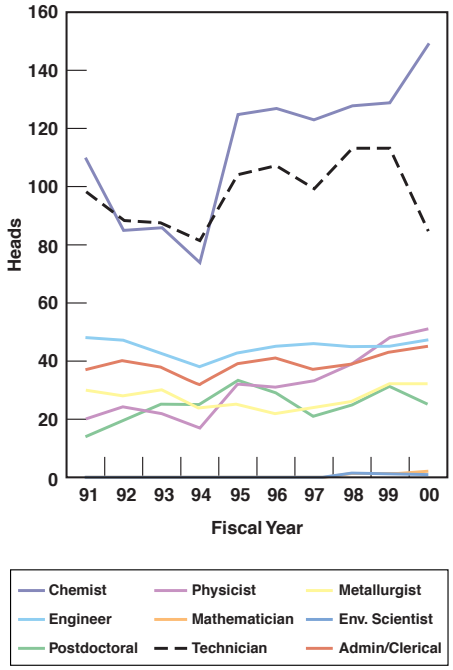


Table 14. *Ten-Year CMS Staff Profile by Classification.*

Discipline	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Chemist	110	85	86	74	125	127	123	128	129	149
Physicist	20	24	22	17	32	31	33	39	48	51
Metallurgist	30	28	30	24	25	22	24	26	32	32
Engineer	48	47	42	38	43	45	46	45	45	47
Mathematician	0	0	0	0	0	0	0	1	1	2
Environmental Scientist	0	0	0	0	0	0	0	1	1	1
Postdoctoral	14	20	25	25	33	29	21	25	31	25
Technician	98	88	87	81	104	107	99	113	113	85
Admin/Clerical	37	40	38	32	39	41	37	39	43	45
Total CMS (Heads)	**357**	**332**	**330**	**291**	**401**	**402**	**383**	**417**	**443**	**437**

Excludes summer hires and supplemental labor
Dated September 30, 2000



Financial and FTE Highlights

Figure 17 illustrates how CMS will be funded in FY01, summarized as follows:

Internal CMS Funding

- **Institutional Investment**—funding comes from the Laboratory General and Administrative (G&A), IGPE, LDRD collections.
- **CMS Infrastructure**—funding comes from CMS Directorate Program Development Charge (PMC), Organizational Facility Charge (OFC), and Organizational Personnel Charge (OPC) collections.
- **Discipline S&T**—funding comes from DOE, federal and non-federal sponsors.
- **Program Support**—funding comes from CMS Scientific Service Centers collections.

Non-CMS Funding

Program Support—The Directorate primarily provides discipline personnel for support to all the Programs of the Laboratory. Support for matrixed staff to Program elements is received from other cost centers as FTE allocations.

Table 15 shows a distribution of CMS FTEs for FY00 and planned FY01. CMS scientific services FTEs are shown matrixed out to illustrate support to programs.

Table 16 shows how CMS managed activities are supported according to funding sources. There are four categories:

- Category 1: Discipline Science and Technology (S&T)—consists of research projects over which the Directorate has jurisdiction. In FY00, this involved 16 FTEs of CMS personnel and 10 FTEs matrixed in from other organizations for a total budget of $9.1M.
- Category 2: CMS Infrastructure—consists of indirect activities involved in operating the Directorate. In FY00, this included 59 FTEs of CMS personnel and 35 FTEs matrixed in from other organizations for a total budget of $17.7M.
- Category 3: Institutional Investment—consists of indirect activities. In FY00, this included 23 FTEs of CMS personnel and 20 FTEs matrixed in from other organizations for a total budget of $13.0M.
- Category 4: Program Support—consists of scientific services (e.g., analytical and processing activities) supporting programs at LLNL. In FY00, this included 42 FTEs of CMS personnel and 11 FTEs matrixed in from other organizations for a total budget of $9.2M.

In FY00, the sum for the CMS managed operating cost center was $49.0M with 214 FTEs

(139 CMS and 75 matrixed in). When added to the estimated cost of personnel matrixed (246 FTEs) to support programs, the Directorate's total operating cost was about $108.5M with a capital equipment budget of $2.0M for a total of $110.5M.

In FY01, the CMS managed operating cost center is expected to be $47.3M with 211 FTEs (143 CMS and 68 matrixed in). When added to the estimated cost of personnel matrixed (249 FTEs) to support programs, the Directorate's total operating cost would be about $107.5M with a capital equipment budget of $2.0M for a total of $109.5M.

Figures 18 and 19 show operating and capital costs along with FTEs from FY92 to FY01 (planned).

Figure 17. *How CMS Is Funded FY01 ($K).*

Funding Sources for CMS

Institutional	**13,731**
Infrastructure	**17,900**
Discipline S&T	**9,325**
Program Support	**68,564**
Total:	**109,520**

Note: CMS managed operating & capital $47,270K.

Institutional Investment

Institutional	**13,731**
G&A	7,692
Postdocs/Summers	700
LDRD–ERD	3,689
IGPE–Capital Equipment	1,650

Note: Deputy Director S&T manages LDRD Lab-wide.

Infrastructure

Infrastructure	**17,900**
Facilities	7,150
Info Systems (OFC)	2,000
Personnel (OPC)	7,800
Program (PMC)	950

Discipline S&T

Discipline S&T	**9,325**
BES	3,540
BES–CE	400
Other Direct	185
WFO	5,200

Program Support

Program Support	**68,564**
249 CMS FTEs matrixed (other AD cost centers)	62,250
Scientific Service Centers	6,314

Figure 18. *Ten-Year Distribution of Operating and Capital Funds ($M) for CMS Cost Centers.*

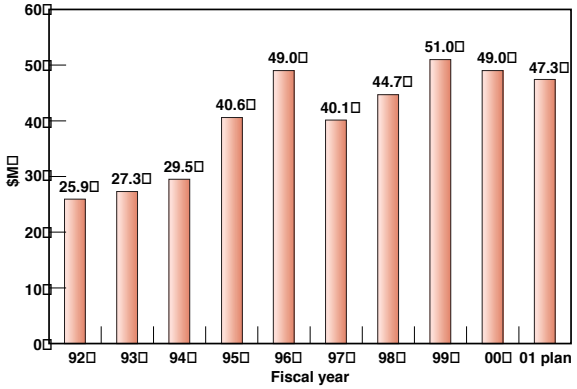


Figure 19. *Ten-Year Distribution of CMS and Other FTEs Supported for CMS Cost Centers.*

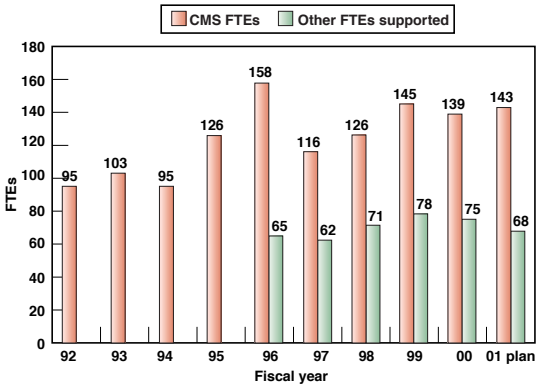


Table 15. *Distribution of CMS FTEs.*

	FY00 Actual	FY01 Plan
CMS Internal Programs	**98**	**106**
Discipline S&T	16	18
Infrastructure	59	60
Institutional Investment	23	28
Program Support & Matrixed Out	**288**	**285**
CMS Program Support	42	36
DNT	101	119
NIF–ICF	39	30
Energy & Environment	35	28
NAI	43	43
Physics Advanced Technology	3	3
Engineering	5	5
Plant Operations	1	0
Various	19	21
Total CMS FTEs	**386**	**391**

Minor variances may be due to rounding

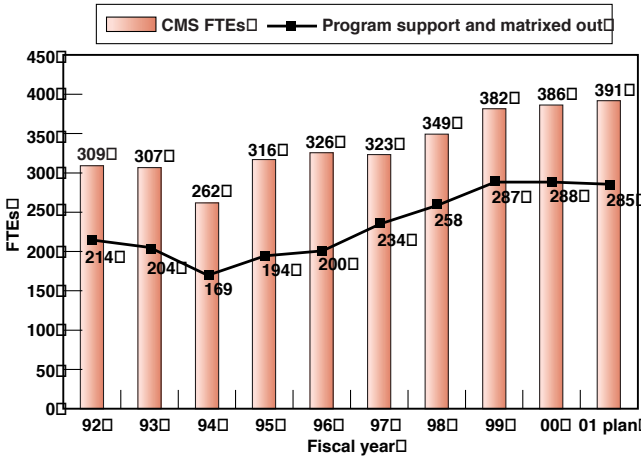


Table 16. *Distribution of Operating and Capital Funds ($M) and FTEs for CMS Cost Centers.*

	FY00 Actual 9-30-00			FY01 Planned 11-25-00		
	$(M)	CMS FTEs	Other FTEs	$(M)	CMS FTEs	Other FTEs
Category 1: Discipline Science & Technology	**9.1**	**16**	**10**	**9.3**	**18**	**10**
DOE-Direct						
Basic Energy Sciences (KC02)	3.4	4	2	3.5	7	4
OBES Capital Equipment/Fabrication	0.1	0	0	0.4	0	0
Other DOE-Direct	0.2	1	1	0.2	0	0
Work for Others						
WFDOE	1.9	6	0	1.9	6	0
Federal Agencies	2.5	2	1	1.1	1	1
Non-Federal	0.9	3	6	2.2	4	5
Category 2: CMS Infrastructure	**17.7**	**59**	**35**	**17.9**	**60**	**43**
Organizational Personnel Charge (OPC)	7.8	45	3	7.8	43	9
Program Management Charge (PMC)	0.8	5	0	1.0	7	0
Organizational Facility Charge (OFC)	9.1	9	32	9.2	10	33
Category 3: Institutional Investment	**13.0**	**23**	**20**	**13.7**	**28**	**13**
General & Administrative (G&A)	7.7	13	16	7.7	17	9
G&A-Special Employee Program (Postdoctoral/Summers)	0.7	0	0	0.7	0	0
Institutional General Purpose Equipment (IGPE)	1.6	0	0	1.7	0	0
LDRD-Exploratory Research in the Disciplines (ERD)	3.0	10	4	3.7	12	4
Category 4: Program Support	**9.2**	**42**	**11**	**6.3**	**36**	**3**
Scientific Service Centers	9.2	42	11	6.3	36	3
Total CMS Operating & Capital	**49.0**	**139**	**75**	**47.3**	**143**	**68**

Minor variances may be due to rounding

CMS Facilities at Site 200

Site 200 is located within the Livermore city limits on one square mile of land. CMS facilities are in the heart of the Laboratory and all facilities are within walking distance (about five minutes).

CMS has several unique chemistry facilities needed to accomplish LLNL programmatic missions. These capabilities include isotope sciences and radiochemistry diagnostics; analytical and characterization services and technology; and material and chemical process theory, modeling, and computations.

Facilities Profile

The Directorate operates four facility complexes at the Main Site: B132N, B151, B235, and B241 (see Table 17).

For additional CMS facilities and site development information refer to the LLNL Program Area Plan (PAP) planning document available at http://www.llnl.gov/llnl_only/plant_eng/paps/cms_pap/cmspap.html

Table 17. *Site 200 Facilities Profile.*

Bldg.	Bldg. Characteristics	Primary Functions	Major Projects	Facility Acquisition Cost
B132N/133: Chemistry Laboratories	• 5 yrs old • 210K gross sq. ft. • Limited Access • Wet Chemistry • 32 Labs • 80 Offices	• Synthesis, Formulation, and Processing Chemistry • Chemical Analysis • Forensics Science		• Facility $34M • Equip $12M
B151/154: Analytical & Isotopic Laboratories	• B151 33 years old B154 9 years old • 109K Gross sq. ft. • Limited/Controlled Access • Wet Chemistry • 71 Labs • 111 Offices	• Isotope Sciences and Radiochemistry Diagnostics • Analytical and Characterization Services and Technology • Geochemistry • Stockpile Stewardship • GTS–ITS	• Started ISF Line Item • Began design of B155 Office Bldg. • Began construction of B154 HVAC upgrades • Began occupancy and activation of BSSL laboratories in B154	• Facility $48M • Equip $15M
B235: Materials Science Laboratories	• 13 years old • 91K Gross sq. ft. • Limited/Controlled Access • Instrument Labs • 30 Labs • 116 Offices	• Materials Development and Technology • Material and Chemical Process Theory, Modeling, and Computation • Materials Characterization Services and Technology	• Completed SAR for accelerator	• Facility $29M • Equip $29M
B241: Materials Technologies Facility	• 40 years old • 63K Gross sq. ft. • Controlled Access • Instrument Labs • 30 Labs • 1 Hi-bay • 40 Offices	• Materials Development and Technology • Materials Disposition • Materials Containment	• Started ISF Line Item • Completed reroofing B241	• Facility $21M • Equip $7M

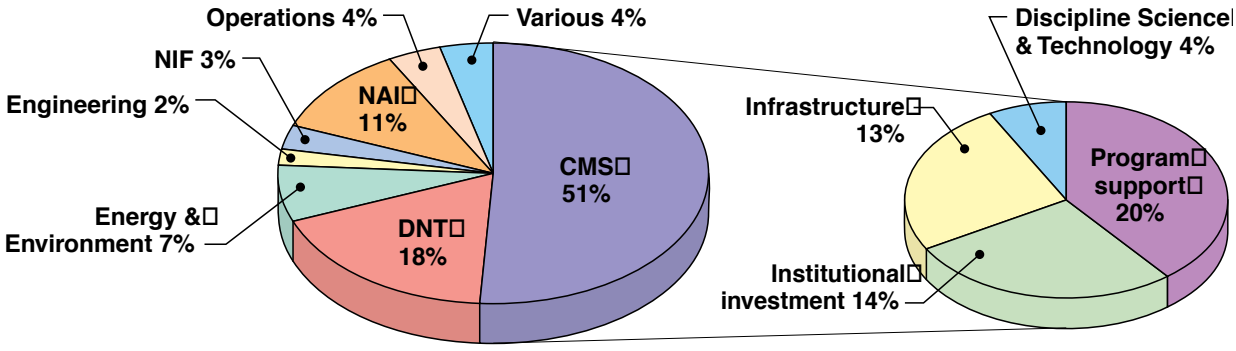
OFC Collections

In FY00, OFC collections include $7.1M for CMS owned space (space types include: laboratory, office, cubicle, shop, inside storage, and transportainer/outside storage) and $1.9M for Information Systems (e.g., network and central services) see Table 18. CMS cost centers paid $4.6M or 51%.

Table 18. *CMS Site 200 Space—Who Pays.*

Directorate	FY00 $K	%
CMS		
Institutional Investment	1,218	14%
Infrastructure	1,137	13%
Discipline Science & Technology	396	4%
Program Support	1,827	20%
DNT	1,647	18%
NAI	1,025	11%
Energy & Environment	594	7%
Operations	401	4%
NIF	250	3%
Engineering	170	2%
Various	339	4%
Total CMS OFC Collection	**9,004**	**100%**

Dated September 30, 2000



CMS Facilities at Site 300

Site 300 is set on 7,000 acres of land about 15 miles east of Livermore. It is marked by both rolling hills and steep ravines with very few trees in sight. When it was established in 1955, Site 300 was in a very remote area surrounded only by cattle ranches. It is still remote, but today the growing city of Tracy is expanding toward the site from the east.

At Site 300, CMS facilities are divided into three groups as shown in Table 19: (1) Chemistry Area, (2) Process Area, and (3) Explosives Waste Storage Facility and Explosives Waste Treatment Facility.

Chemistry Area

The Chemistry Area is used to formulate and synthesize HE compounds, scaleup laboratory and/or bench scale size HEs formulations to production scale, and to perform precision loading of shaped charges using extrusion technology.

Process Area

The Process Area is used to produce precision HEs parts and assemblies. The processing area facilities contain the machine tools, isostatic presses, radiography equipment and precision assembly facilities necessary for the manufacture of HE parts.

Explosives Waste Storage Facility and Explosives Waste Treatment Facility

As a result of operations at Site 300 and the High Explosives Application Facility (HEAF), explosives wastes are generated. The explosives waste facilities at Site 300 are comprised of the Explosives Waste Storage Facility (EWSF) and Explosives Waste Treatment Facility (EWTF). Both of these Facilities have California Department of Toxic Substances Control (DTSC) permits for the storage and treatment of explosives wastes deemed hazardous by federal and state regulations. The EWSF is located in the Process Area and is used to store explosives wastes for up to one year. The EWTF is located at Building 845 in a remote area and is used for the open burning or open detonation of the explosives wastes. The EWTF also operates under an air permit from the San Joaquin Unified Air Quality Control District.

Table 19. *CMS Site 300 Facilities Profile.*

Facility	Facility Characteristics	Primary Functions	Capability
Chemistry Area [1]	• Average 20 years old • 8 Formulations/Synthesis/ Injection/Molding • 2 Mechanical Pressing Bays • 3 Storage Magazines	• Synthesis • Formulation • Mechanical Pressing • Scaleup	• Custom manufacturing of explosives, some transferred to industry for commercialization (e.g.,simulants, special operations, shaped charges)
Process Area [1]	• Average 40 years old • 7 Machine Bays • 1 Inspection Bay • 4 Assembly Bays • 2 Radiography Bays • 1 Isostatic Pressing Bay • 1 HE Heating Bay • 2 Surface Impoundments	• Hot Isostatic Press • Radiography • Machining • Inspection • Assembly	• Precision, custom manufacturing of HE components and devices for R&D testing
Explosives Waste	• Average 40 years old—former storage magazines and shot test facility • 3 Storage Magazines • 1 Control bunker; detonation pad; burn cage; burn pan	• Storage • Treatment	• State-permitted Storage Facility for 1 year storage • State-permitted Treatment Facility with open burn/open detonation capabilities

[1] The Chemistry and Process Areas comprise 22 major facilities; 15 storage magazines, 8 service magazines, totaling 58,500 square feet, total equipment replacement cost $30M.

Research Administration and Funding

Research is considered an integral part of the Directorate's discipline development. Oversight and policy-making are vested in the AD's office. Currently, the Principal Deputy AD assumes general responsibility for administering the research effort with guidance from the AD and Consultation with Division Leaders and Program Leaders. Programs and projects are reviewed internally as well as externally.

Funding for research and development that is managed in the Directorate comes primarily from LDRD, DOE Office of Basic Energy Services (DOE/OBES), and Reimbursable/WFO.

Laboratory Directed Research and Development (LDRD)

The DOE has issued an Order to provide for an LDRD Program that will allow the use of an annual percentage of the Laboratory's budget for discretionary research (6% for FY01). The LDRD Program at LLNL is divided into three major funding categories: Strategic Initiatives (SIs); Exploratory Research in the Disciplines (ERD), Programs, and Institutes; and Laboratory-wide (LW) Competition.

Strategic Inititatives (SI)

An SI project should describe innovative research and development activities that are likely to set new directions for existing programs, will help develop new programmatic areas within our mission responsibilities, and/or will enhance the Laboratory science and technology base. An SI project must have the active support of at least one of the four Laboratory Strategic Councils. In the realm of SIs, the Directorate usually participates as a key member of a team on a Program-sponsored initiative rather than directly leading one, although exceptions to this do occur. For example, in FY01 a member of the CMS staff is serving as the Principal Investigator for an SI.

Exploratory Research in the Disciplines (ERD), Programs and Institutes

These research and development activities are intended to support pioneering research and development projects that set new directions for the Laboratory and/or enhance the core competencies and the science and technology base for the Laboratory. The Exploratory Research in the Programs is funded by R&D collections returned to the directorates that generate the funds. Such funds are designated to provide the technical base for developing both existing and future programs for the Laboratory. CMS frequently plays a role in these projects, through personnel supporting the execution of the science and occasionally by providing the leader for the project. In general, support for a project is limited to, at most, three consecutive years in this Program. Table 20 shows FY01 CMS ERD projects.

The primary focus of CMS within its LDRD ERD portfolio is to support the longer-range research objectives of the Laboratory's Programs. CMS influences the direction and development of these objectives by contributing to new science and capabilities. Two strategic objectives define how CMS uses its ERD portfolio:

1. **Program-related ERD.** Fundamental research that provides a basic scientific understanding of a specific issue faced by a program and acknowledged by the program as being important. CMS refers to this as program-related LDRD and, in many cases, CMS is successful in getting the programs to co-invest their LDRD funds on these projects. Table 20 summarizes program-related CMS projects and associated programmatic co-investments.
2. **New Scientific Capabilities**. Development of new science and capabilities focused on chemistry that will seed enduring, externally funded, fundamental science in areas of current or future importance to the Laboratory. CMS refers to this grouping of projects as new scientific capabilities. In some cases, these projects represent a new focus area such as Bioscience shown in Table 20.

CMS' selection process focuses on projects meeting these strategic objectives but also considers several other important criteria:

- Projects must be based on the execution of excellent science.
- Whenever possible, projects should provide an opportunity for our more experienced scientists to work with our younger staff, and especially postdoctoral students, in a mentoring relationship.
- Partnering/collaboration with other directorates is encouraged in all areas, and required for program-related research.

Laboratory-wide (LW) Competition

Projects in this category emphasize innovative research concepts and ideas with limited management filtering to encourage the creativity of individual researchers. Table 20 also includes seven projects funded from Lab-wide Competition (managed by the Laboratory's S&T Deputy Director).

Table 20. *CMS FY01 LDRD Projects and Funding Levels.*

CMS Contact	Project Title	Funding $K	Other Directorate CMS Funds
	Strategic Initiative (SI)		
Lassila	01-SI, Material Strength at High Pressure		1,500
	Total SI		**1,500**
	Exploratory Research in the Directorates (ERD)		
	Program-related ERD—DNT		
Campbell	01-ERD, Shear Localization & Fracture in Shocked Metals	140	249
Balazs	01-ERD, Life-Performance	108	119
Schwartz	01-ERD, Metastability & Delta-Phase Retention	160	340
Allen	01-ERD, Thermodynamics & Structure of PU Alloys	156	332
	Program-related ERD—NAI (contacts are co-PIs)		
Westbrook	00-ERD, Modeling & Experiments for Theater Missile Defense	75	225
Reynolds	01-ERD, Nanoscience & Nanotechnology in NAI	75	230
Gard	98-ERD, Real-time Detection Identification of Biological Aerosols	100	545
	Program-related ERD—E&E		
Pham	01-ERD, Dev of Solid Oxide Fuel Cell Stack	125	150
Wirth	01-ERD, A Combined Multiscale Modeling & Positron Char	100	100
Kersting	00-ERD, Colloidal Transport of Actinides	160	
	Program-related ERD NIF Programs		
Suratwala	00-ERD, Slow Crack Growth Behavior	100	
Genin	00-ERD, Laser Deposition of Thin Films	250	
	New Scientific Capabilities—Biology/Biotechnology		
Shields	00-ERD, Biological Mass Spectrometer	275	
Gygi	00-ERD, Coupled Solvation Model	50	50
Noy	00-ERD, Carbon Nanotube AFM	135	
Van Buuren	00-ERD, Smart Membranes	185	
DeYoreo	01-ERD, Probing Interactions	220	
Cary	01-ERD, Multifunctional Ligand Design	200	
Wilson	99-ERD, Nanolaminates	275	
Darrow	99-ERD, Single Molecule Detection	100	
	New Scientific Capabilities—General		
Maxwell	01-ERD, Dev of Direct & Optical Polarized	200	
Fox	99-ERD, Chemistry & Processing of Nanostructured Materials	250	
Zaug	99-ERD, Kinetics of Elementary Reactions	250	
	Total ERD	**3,689**	**2,340**
	Lab-Wide (LW) Competition		
Baumann	01-LW, Three-Dimensional Nanoscale Structures		118
Darrow	01-LW, Single-Molecule Techniques		164.9
Hayes	00-LW, High Sensitivity Optically Polarized NMR		179.7
Huser	00-LW, Surface-Enhanced Raman Spectroscopy		165
Maxwell	01-LW, Solid State NMR Method		157.8
Noy	01-LW, Direct Imaging of DNA-Protein Complexes		168.5
Vance	01-LW, Surface Attachment		128.1
	Total LW		**1,082**

DOE Direct

The Directorate coordinates funds obtained from the Office of Basic Energy Sciences, Division of Materials Sciences (OBES/DMS), which totaled $3.8M for FY00 (see Table 21). In addition to execution of the majority of the program, this includes reporting, oversight and review for the entire program. The Livermore OBES/DMS Program has three major components:

- **Metallurgy and Ceramics Program**—addresses a diverse range of topics including adhesion and bonding at internal interfaces, fundamental characterization and modeling of welding processes, as well as research focused on the fundamentals of superplastic deformation.
- **Solid-State Physics Program**—has three components addressing new concepts in modeling radiation damage in solids, the development and characterization of new optical materials including new lasing materials, and the development of positron science as a key materials characterization technique.
- **Materials Chemistry Program**—addresses the science of thin buried layers and the exploration of innovative new techniques for characterizing magnetic properties at the atomic level.

Scientific and Technical Achievements

Table 22 lists the Directorate scientific and technical achievements for the 1999 calendar year.

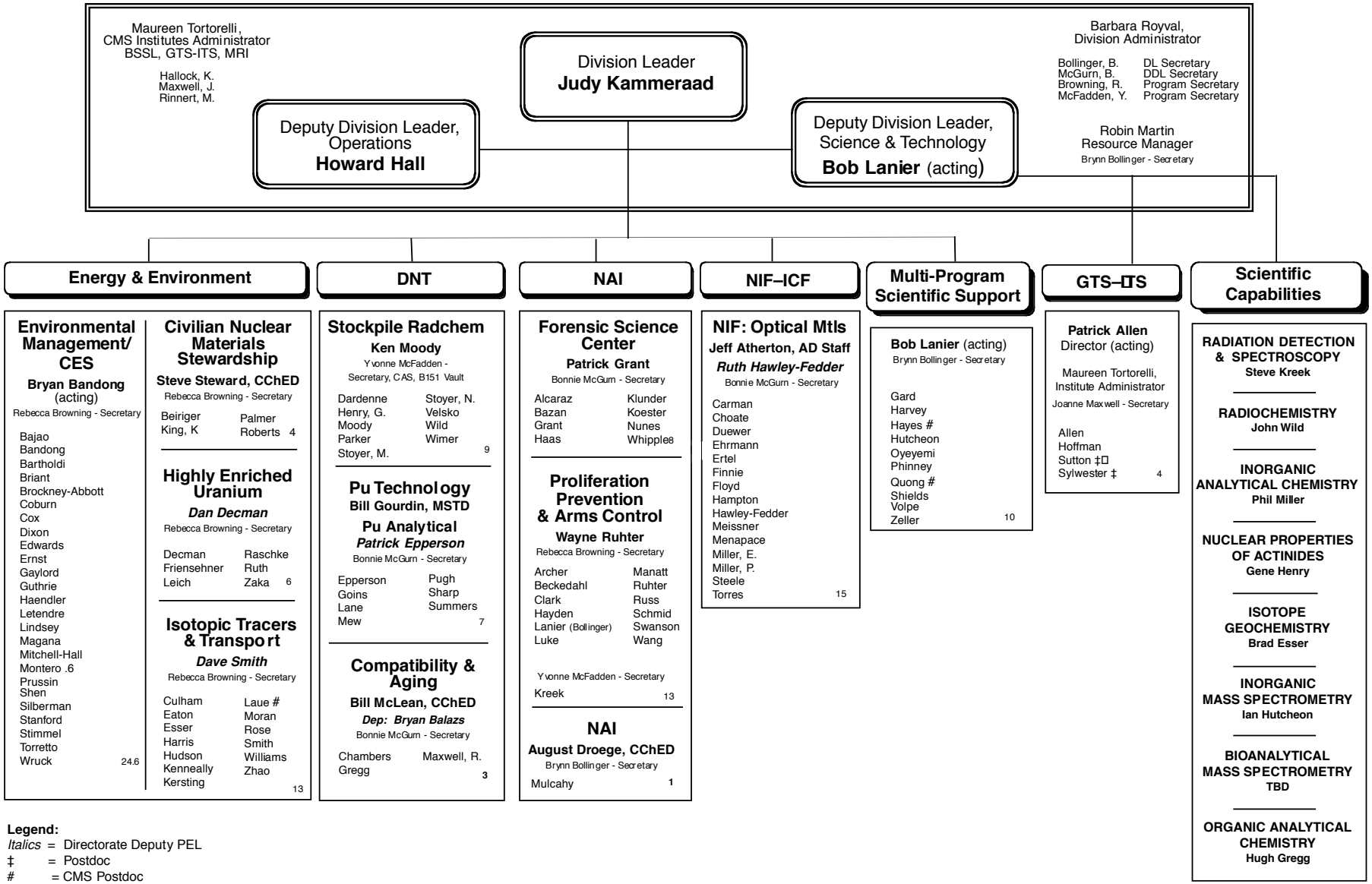
Table 22. *Scientific and Technical Achievements (Jan–Dec 99).*

Metric	Jan–Dec 99 Appraisals
Major Awards	4
R&D 100 Awards	1
Patent Disclosures	17
Patent Applications	16
Patents Issued	9
Licenses Executed	3
Refereed Publications	226
Invited Presentations (major conferences)	94
Journal Editorships	1
Conferences Organized	9
Editorial Boards	20

Table 21. *CMS FY00 OBES Projects and Funding Levels.*

CMS Contact	Project Title	Operating ($K)	Capital ($K)
Materials Science			
Diaz de la Rubia	Radiation Damage	288	—
Elmer	Kinetics of Phase Transformation	591	—
Howell	Positron Research	288	—
Howell	Positron Contract	261	—
King	Adhesion & Bonding at Internal Interfaces	331	—
Newkirk	Materials Science Research Capital Equipment	—	541
Newkirk	Center of Excellence Synthesis Processing	225	—
Nieh	Interfaces & Interphases on Superplasticity	574	—
Payne	Optical Materials	212	—
Quong	Physical Properties	248	—
Terminello/Mailhiot	Growth & Formation of Advanced Heterointerfaces	443	—
Tobin	Investigation of Nanoscale Magnetics	463	—
Total CMS OBES		**$ 3,924**	**$ 541**

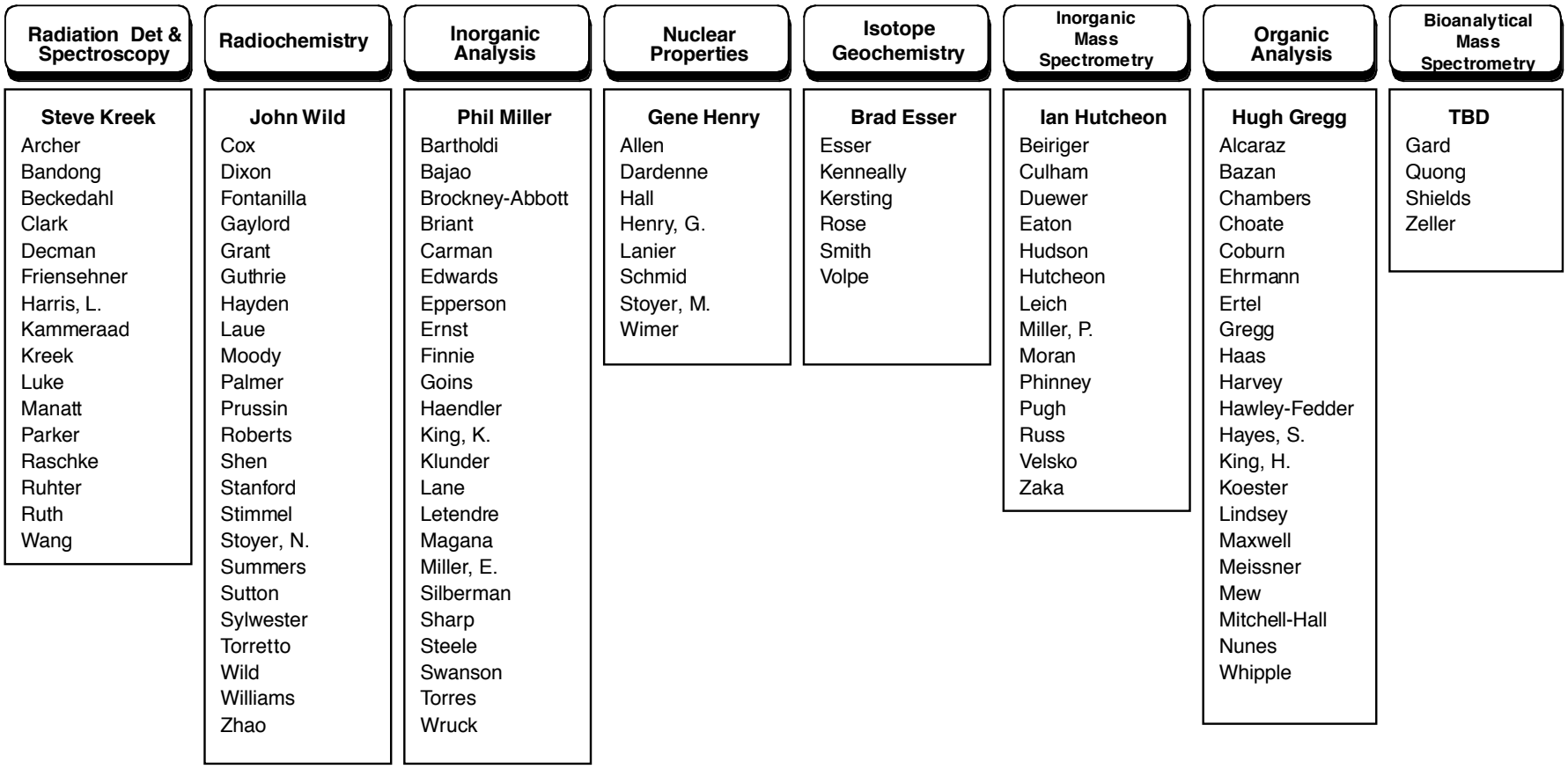
Analytical & Nuclear Chemistry Division



Legend:
Italics = Directorate Deputy PEL
‡ = Postdoc
# = CMS Postdoc

12/4/00

Analytical & Nuclear Chemistry Division
Scientific Capabilities



Chemistry & Chemical Engineering Division

Deputy PL for ES
James LeMay

SSP HE Leader
Randall Simpson

DoD
Technologies
César Pruneda

DoD

Division Leader
Charles K. Westbrook

Deputy Division Leader,
Operations
Erica von Holtz

Deputy Division Leader,
Science & Technology
Glenn Fox

Karen Jautaikis - **Division Administrator**

Christina Quin - Division Secretary
Sharon Crowder Kathleen Poeckert
Helen Meredith Dannelle Tanner
Jacqy Turner

Nancy Schoendienst- **Resource Manager**

DNT

Energetic Materials
PEL: J. Maienschein
Secretary - S. Crowder
Secretary- J. Turner

W. Black
A. Boegel
J. Chandler
B. Cunningham
L. Daniels
A. Esposito
J. Forbes
L. Fried
F. Garcia
R. Garza
R. Gee (FX)
K. Glaesemann (PD)
L. Green (R)
M. Hoffman
M. Howard
P. Hsu
M. Kumpf
J. Kury (R)
L. Lauderbach
E. Lee (R)
G. Lee
R. Manaa
M. McClelland
A. Mitchell
J.Molitoris
M. Murphy
A. Nichols
A. Niles (FX)
P. Pagoria
K. Pederson
M. Sappenfield (R)
R. Schmidt
L.R. Simpson
C. Souers
R. Swansiger
C. Tarver
T. Tran
P. Urtiew (R)
K. Vandersall (PD)
P. Vitello
J. Wardell
B. Watkins
S. Weber
R. Weese
J. Zaug

Weapon Materials Compatibility & Aging
PEL: W. McLean
Sec. - H. Meredith

B. Balazs, *Dep P*
D. Calef
B. Cena
I. Chiu
H. Golopol (R)
P. Lewis
E. Mones
J. Nielsen
G. Overturf
M. Schildbach
L. Spellman

Pu Technology
PEL: W. Gourdin (MSTD)
Secretary – H. Meredith

Y. Zundelevich

NIF–ICF

NIF Optics
PEL: J. Atherton
A. Burnham
Sec. – H. Meredith

L. Auyang (FX)
J. Britten
J. Fair
K. Foster
C. Hoaglan
L. Hrubesh
T. Land
W. Miller (R)
T. Parham
M. Riley
C. Thorsness
E. Wheeler (PD)
P. Whitman

ICF Target Fab
PEL: R. Wallace (MSTD)
Secretary – H. Meredith

C. Alviso
S. Buckley
C. Chancellor (FB)
B. Cook
E. Fearon
A. Hassel (FX)
S. Letts

Energy & Environment

YMP
PEL: S. Steward
Sec. - H. Meredith

S. Hulsey
H. Leider (R)
L. Logoteta

NAI

PEL: A. Droege
Sec. – H. Meredith

M. Adamson
D. Camp
R. Grimm (FX)
D. Jones
F-M. Kong
C. Olson (FX)
D. Shoemaker
C. Stevens

CMS

Advanced Material Synthesis
PEL: J. Satcher
Secretary - H. Meredith

T. Baumann
D. Cary
P. Coronado
A. Gash (PD)
L. Hope-Weeks (PD)
A. Lee
R. Madabhushi (FX)
L. Murguia
J. Poco
R. Reibold
J. Reynolds
B. Sanner
T. Tillotson
A.Vance (PD)

Computational Chemistry
SCL: C. Westbrook
Secretary: C. Quin

K. Balasubramanian
L. Cloutman
A. Kubota (PD)
C. Melius
W. Pitz
C. Schaldach (FX)

BSSL
PEL: W. Wilson
Secretary: C. Quin

J. Klare (S)
J. Young (PD)

Scientific Capabilities

Chemical Engineering
- Thermodynamics, Kinetics, Mass Transfer
- Fluid Mechanics, Heat Transfer
- Materials Science, Interfacial Phenomena and Colloids
- Optics, Energetic Materials, Molten Metals and Salts

Chemical Synthesis & Processing
- Organic, Polymer, Organometallic, Inorganic Synthesis
- Low-Density Microporous Materials
- Polymer Processing & Formulation
- Nanostructured Materials

Computational Chemistry
- Combustion Modeling
- THE Kinetics
- Computational BioElectro Chemistry

Energetic Materials
- Explosives Synthesis and Formulation
- Physical and Thermal Properties
- Performance & Hazards Measurements
- Demilitarization

Physical Chemistry
- Applied Spectroscopy
- Physical Measurements
- Kinetics

Summer Students

J. Boercker
A. Miller
B. Parrish
J. Radford
E. Reed

Legend:
FB = Temp >6 <12 months
PD = Postdoc
R = Retiree
S = Subcontractor
FX = Flex Term

2/14/01 16:35

Chemistry & Chemical Engineering Division
Scientific Capabilities

Chemical Synthesis & Processing

SCL: J. Satcher

Aerogels
P. Coronado
J. Poco
R. Riebold
J. Satcher
T. Tillotson

Polymers
M. Hoffman*
S. Letts
R. Madabhushi

Synthesis
C. Alviso
T. Baumann
S. Buckley
D. Cary
C. Chancellor
G. Fox
A. Gash (PD)
L. Hope-Weeks (PD)
G. Lee*
A. Mitchell*
P. Pagoria*
J. Reynolds
B. Sanner
R. Schmidt*
A. Vance (PD)

Chemical Engineering

SCL: TBD

L. Auyang
J. Britten
D. Camp
R. Cena
B. Cunningham*
J. Fair
K. Foster
C. Hoaglan
L. Hrubesh
P. Hsu
D. Jones
F.M. Kong
J. Maienschein*
M. McClelland*
W. Miller (R)
T. Parham
M. Riley
D. Shoemaker
C. Thorsness
T. Tran*
B. Watkins*
E. Wheeler (PD)
P. Whitman
Y. Zundelevich

Physical Chemistry

SCL: TBD

Applied Spectroscopy
A. Droege
R. Grimm
T. Land
C. Olson
C. Stevens
J. Zaug*

General Physical Chemistry
M. Adamson
E. Fearon
J. Forbes*
R. Garza*
A. Hassel
S. Hulsey
H. Leider (R)
L. Logoteta
S. Steward
R. Swansiger*

Materials Compatibility
B. Balazs
I. Chiu
H. Golopol (R)
J. LeMay
P. Lewis
W. Mclean
E. Mones
J. Nielsen
G. Overturf*
M. Schildbach
L. Spellman

Computational Chemistry

SCL: C. Westbrook

K. Balasubramanian
D. Calef
L. Cloutman
R. Cook
L. Fried*
M. Howard*
A. Kubota (PD)
R. Manaa*
C. Melius
A. Miller
M. Murphy*
A. Nichols*
W. Pitz
C. Schaldach
C. Souers*
C. Tarver*
P. Vitello*
J. Young (PD)

Energetic Materials*

SCL: J. Maienschein

W. Black
A. Boegel
J. Chandler
B. Cunningham
L. Daniels
A. Esposito (PD)
J. Forbes
L. Fried
F. Garcia
R. Garza
R. Gee (PD)
K. Glaesemann (PD)
L. Green (R)
M. Hoffman
M. Howard
M. Kumpf
J. Kury (R)
L. Lauderbach
E. Lee (R)
G. Lee
R. Manaa
M. McClelland
A. Mitchell
J. Molitoris
M. Murphy
A. Nichols
A. Niles
G. Overturf
P. Pagoria
K. Pederson
M. Sappenfield (R)
R. Schmidt
L.R. Simpson
R. Simpson
C. Souers
R. Swansiger
C. Tarver
T. Tran
P. Urtiew (R)
K. Vandersall (PD)
P. Vitello
J. Wardell
B. Watkins
S. Weber
R. Weese
J. Zaug

* Some people in EM have been double counted

2/14/01

Materials Science & Technology Division

Dick Christensen, Senior Scientist
Bill Wolfer, Senior Scientist
Troy Barbee, Senior Scientist
Mark Bronson, NMTP Assoc. Program Leader

Lou Terminello, Division Leader
Ken Marsh, Deputy Div. Leader, Operations
Tomás Diaz de la Rubia, DDL/S&T

Michael Cooke, Division Resource Manager
Carol Power, Division Administrator

Administrative Staff
Gonzales, Kathy- Division Secretary
Copp, Kathy — **Pullen, Nancy**
Jones, Linda — **Lyons, Sherry**
Manipis, Melina — **Poggio, Nan**

DNT

Pu Technology
Bill Gourdin - PEL
Bart Ebbinghaus - DPEL
(Patrick Epperson - DPEL)
Sherry Lyons - Secretary
Mike Blau
Rich Burns
Bob Gomez
Leonard Gray
Terry Quick
Adam Schwartz
Tom Shell
Paul Curtis
Karen Dodson
Oscar Krikorian (FR)
James Lawson
Doug McAvoy
Harlan Olson
Joe Schmitz
Stephen Thompson
Rich Van Konynenberg

Stockpile Metallurgy and Joining
Gil Gallegos - PEL
Melina Manipis - Secretary
Ralph Condit (FR)
Ron Foreman
Jim Hanafee
Dave Lassila
Vicki Mason-Reed
Rick Randich
Paul Sandoval
Ed Sedillo
Tien Shen
Leonard Summers
Sharon Torres
John Elmer - DPEL
(Joining)
Mark Gauthier
Barry Olsen
Todd Palmer*
Terry Ramos
Larry Wagner

Energy & Environment

Civilian Nuclear Materials Stewardship
Allen Lingenfelter -PEL
Dan McCright - DPEL
Nan Poggio - Secretary
Laura DeLoach
John Estill
Greg Gdowski
Steve Gordon
Bill Halsey
Bev Lum
Tammy Summers
Francis Wang

Solid State Ionics
Quoc Pham - Acting PEL
Nan Poggio - Secretary
Brandon Chung
Jeff Haslam

Environment
John Cooper - PEL
Sherry Lyons - Secretary
Nerine Cherepy
Roger Krueger

NIF–ICF

Mike Fluss - PEL
(Alex Hamza - DPEL)
Nancy Pullen - Secretary
Stavros Demos
Francois Genin
Wigbert Siekhaus
Joe Silveira
Leslie Summers
Tayyab Suratwala
Patrice Turchi

ICF targets
Russ Wallace PEL
Craig Alford

NAI

August Droege - PEL

Materials Characterization

Materials Characterization Centers
Tom Felter - SCL
Kathy Copp - Secretary
Ann Bliss
Dominic Del Giudice
Cheryl Evans
Jim Ferreira
Dennis Fleming
Bob Kershaw
Art Nelson
Cheng Saw
Bob Vallier
Mark Wall
Boyd Westfall

Computational Mat'ls Science

Andrew Quong - SCL
Linda Jones - Secretary
Maria Bartelt
Vasily Bulatov
Maria Caturla
Scott Centoni#
Maurice DeKoning*
Tony Gonis (N.Pullen)
Jaime Marian#
Babak Sadigh*
James Stolken
Surh, Michael
Lisa Wickham*
Brian Wirth

Metallurgy and Ceramics

Wayne King - SCL
Nancy Pullen - Secretary
Geoff Campbell
Bill Choi
Luke Hsiung
Mukul Kumar
Lan Nguyen
T.G. Nieh (K. Gonzales)
Juergen Plitzko*

Nanoscience & Technology

(M. McElfresh - PEL)
Surface Science
Alex Hamza - SCL
Kathy Copp - Secretary
Dario Arena*
Mehdi Balooch
C. Bostedt#
Long Dinh
Michael Hochstrasser*
Jim Tobin
Tony Van Buuren
Joe Wong (M. Manipis)

Biophysical and Interfacial Science
Jim DeYoreo - SCL
Sherry Lyons - Secretary
Chris Hollars*
Thomas Huser
Denise Krol
Aleksandr Noy*
Christine Orme

Coatings
Alan Jankowski - SCL
Nan Poggio - Secretary
Jennifer Alameda
Kerry Bettencourt
Corey Cate
Don Hoffman
Paul Mirkarimi
Martin Stratman
Norm Thomas

Legend:
= Grad Student
* = Postdoc
FR = Fixed Term Retiree
PEL = Program Element Leader
SCL = Scientific Capability Leader

12/15/00

Materials Science & Technology Division
Scientific Capabilities

Electrochemistry and Corrosion

John Cooper - SCL
Nerine Cherepy
Brandon Chung
John Estill
Dennis Fleming
Greg Gdowski
Bob Glass
Steve Gordon
Bill Halsey
Roger Krueger
Bev Lum
Dan McCright
Quoc Pham
Martin Stratman
Leslie Summers
Rich Van Konynenberg
Francis Wang

Materials Characterization

Tom Felter - SCL
Ann Bliss
Dominic Del Giudice
Cheryl Evans
Jim Ferreira
Bob Kershaw
Art Nelson
Juergen Plitzko*
Cheng Saw
Mark Wall
Boyd Westfall

Computational Materials Science

Andrew Quong -SCL
Maria Bartelt
Vasily Bulatov
Maria Caturla
Scott Centoni#
Maurice De Koning*
Tony Gonis
Jaime Marian#
Babak Sadigh*
James Stolken
Michael Surh
Patrice Turchi
Lisa Wickham*
Brian Wirth

Metallurgy and Ceramics

Metallurgy
Michael Blau
Rich Burns
Ralph Condit
Karen Dodson
Bart Ebbinghaus
John Elmer
Gil Gallegos
Mark Gauthier
Francois Genin
Bob Gomez
Bill Gourdin
Leonard Gray
Jim Hanafee
Dave Lassila
James Lawson
Luke Hsiung
Al Lingenfelter
Vicki Mason-Reed
Doug McAvoy
T.G. Nieh
Barry Olsen
Harlan Olson
Todd Palmer*
Terry Quick
Terry Ramos
Rick Randich
Paul Sandoval
Joe Schmitz
Adam Schwartz
Ed Sedillo
Tien Shen
Lenny Summers
Tammy Summers
Stephen Thompson
Sharon Torres
Bob Vallier
Larry Wagner

Ceramics
Corey Cate
Bill Choi
Paul Curtis
Jeff Haslam
Oscar Krikorian
Tom Shell
Joe Silveira
Tayyab Suratwala

Interfaces
Wayne King - SCL
Geoff Campbell
Mukul Kumar
Lan Nguyen

Nanoscience, Technology and Multilayers

Coatings
Alan Jankowski - SCL
Jennifer Alameda
Craig Alford
Troy Barbee
Kerry Bettencourt
Ron Foreman
Don Hoffman
Paul Mirkarimi
Norm Thomas
Russ Wallace

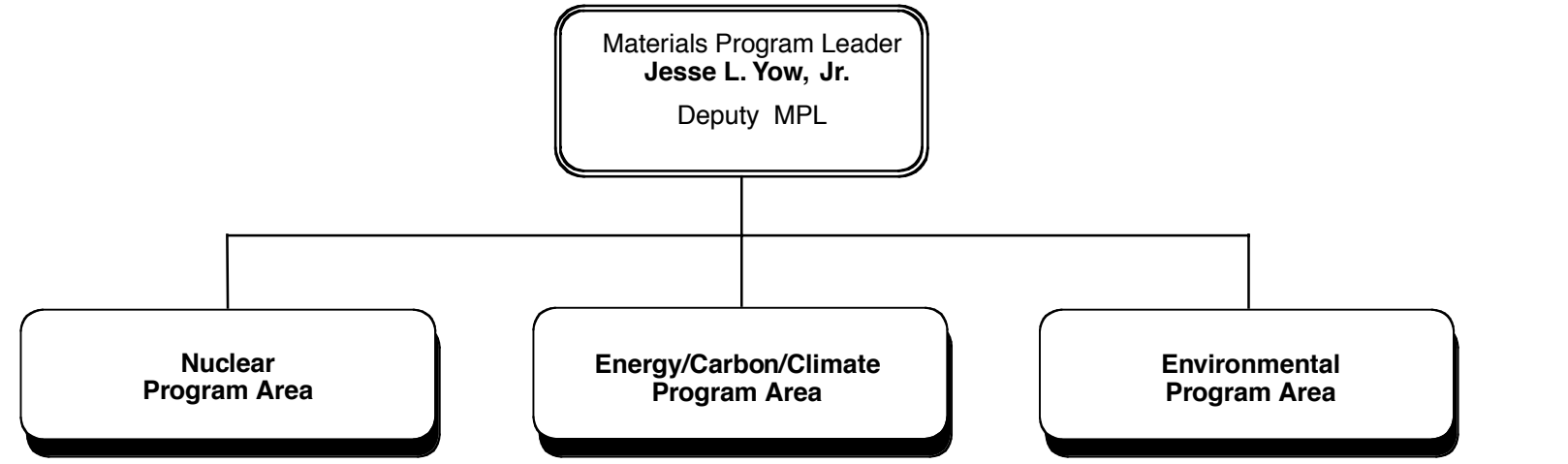
Biophysical and Interfacial Science
Jim DeYoreo - SCL
Laura DeLoach
Stavros Demos
Chris Hollars*
Thomas Huser*
Denise Krol
Aleksandr Noy*
Christine Orme

Surface Science
Alex Hamza - SCL
Dario Arena*
Mehdi Balooch
Christoph Bostedt#
Long Dinh
Michael Hochstrasser*
Wigbert Siekhaus
Jim Tobin
Tony Van Buuren
Joe Wong

Legend:
= Grad Student
* = Postdoc
() = New hires or anticipated hires
PEL = Program Element Leader
SCL = Scientific Capability Leader

12/15/00

Energy & Environment
Materials Program Office



—PELs for Yucca Mountain Program

—PEL for HEU Transparency Program

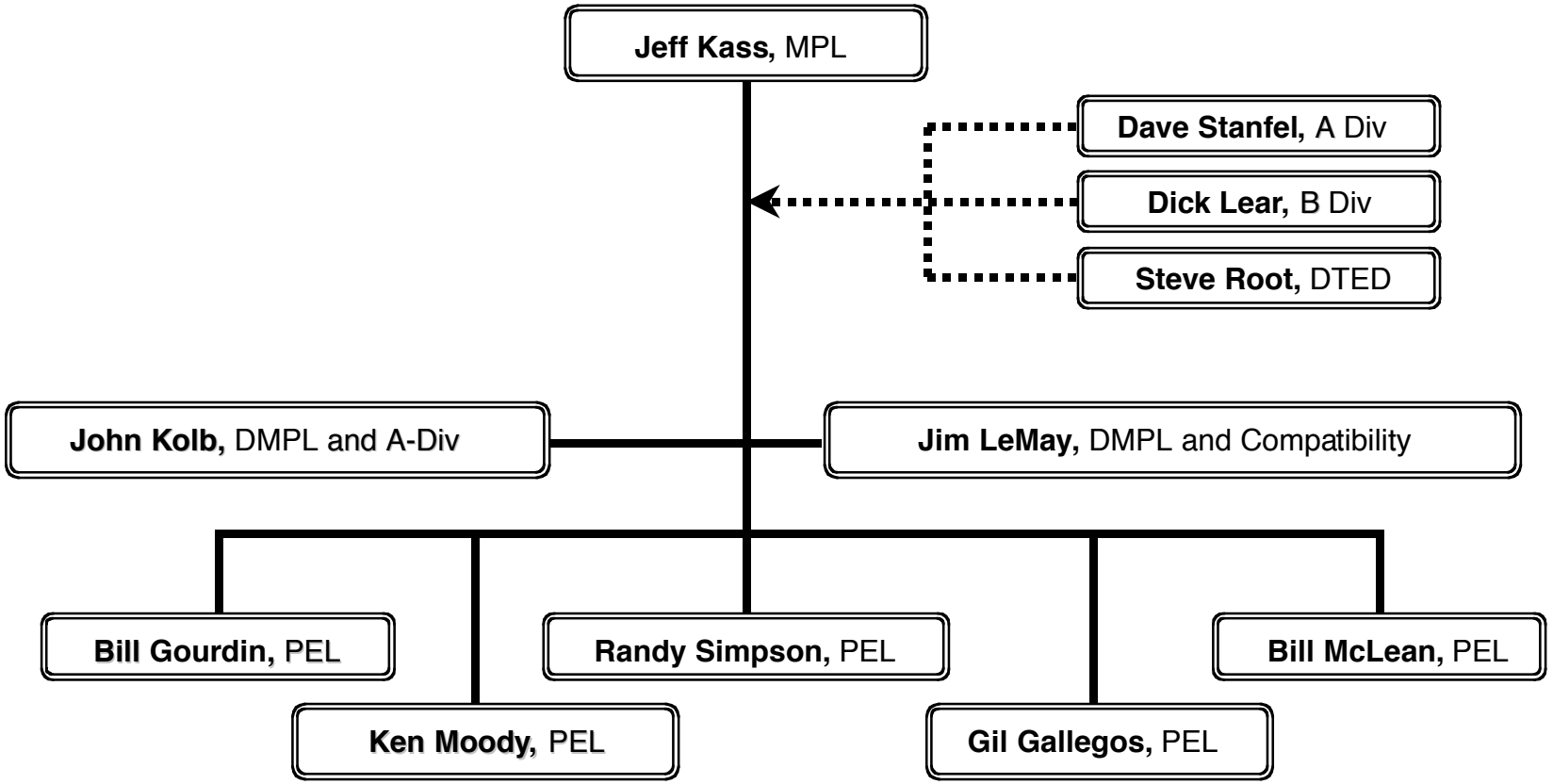
PELs for Applied Energy Technologies Programs

—PEL for CMS Environmental Services

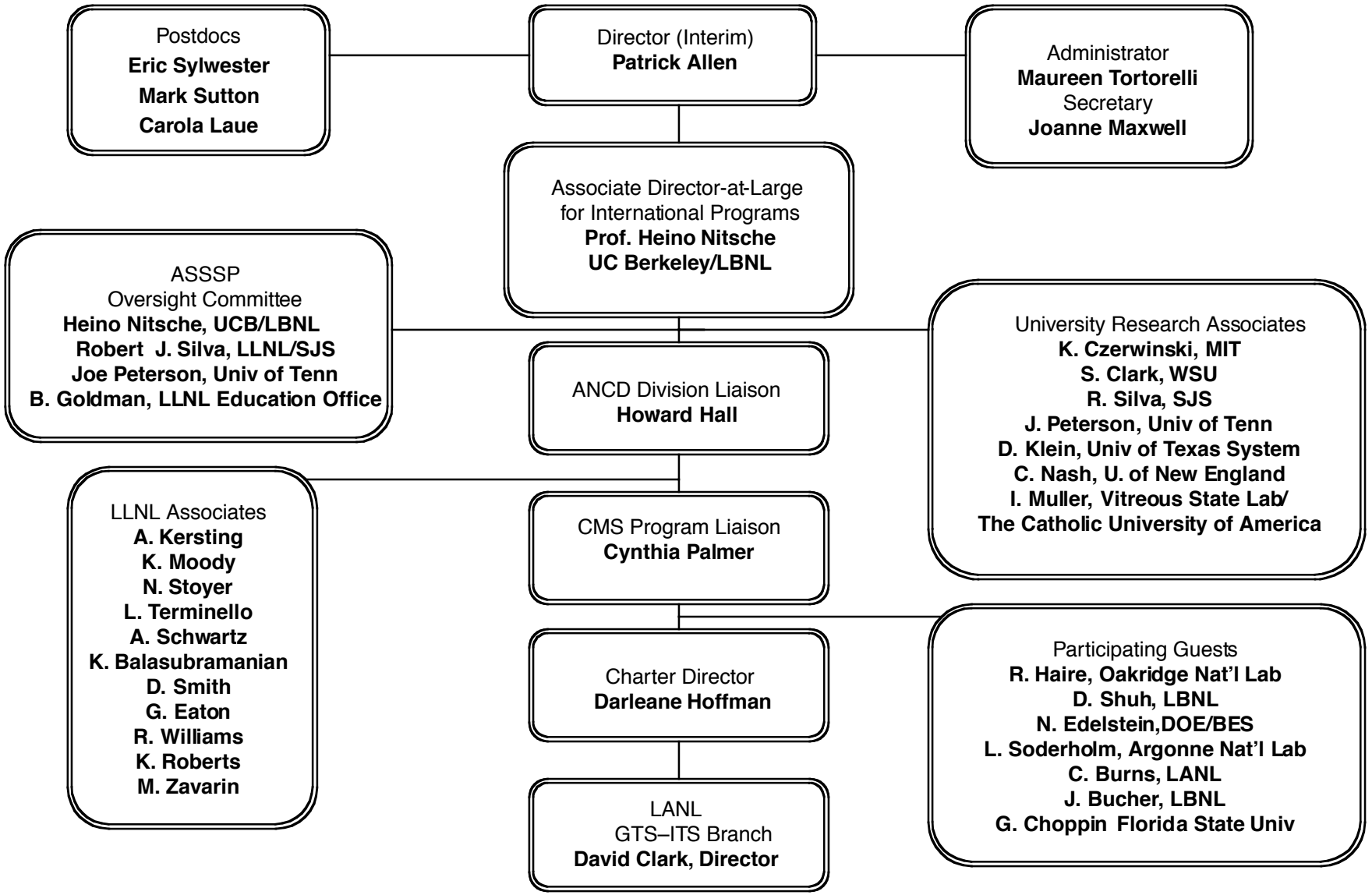
—PEL for Environmental Protection Programs

—PEL for Water Resource R&D

Stockpile Stewardship Management Program
MPL Structure



The Glenn T. Seaborg Institute for Transactinium Science at LLNL



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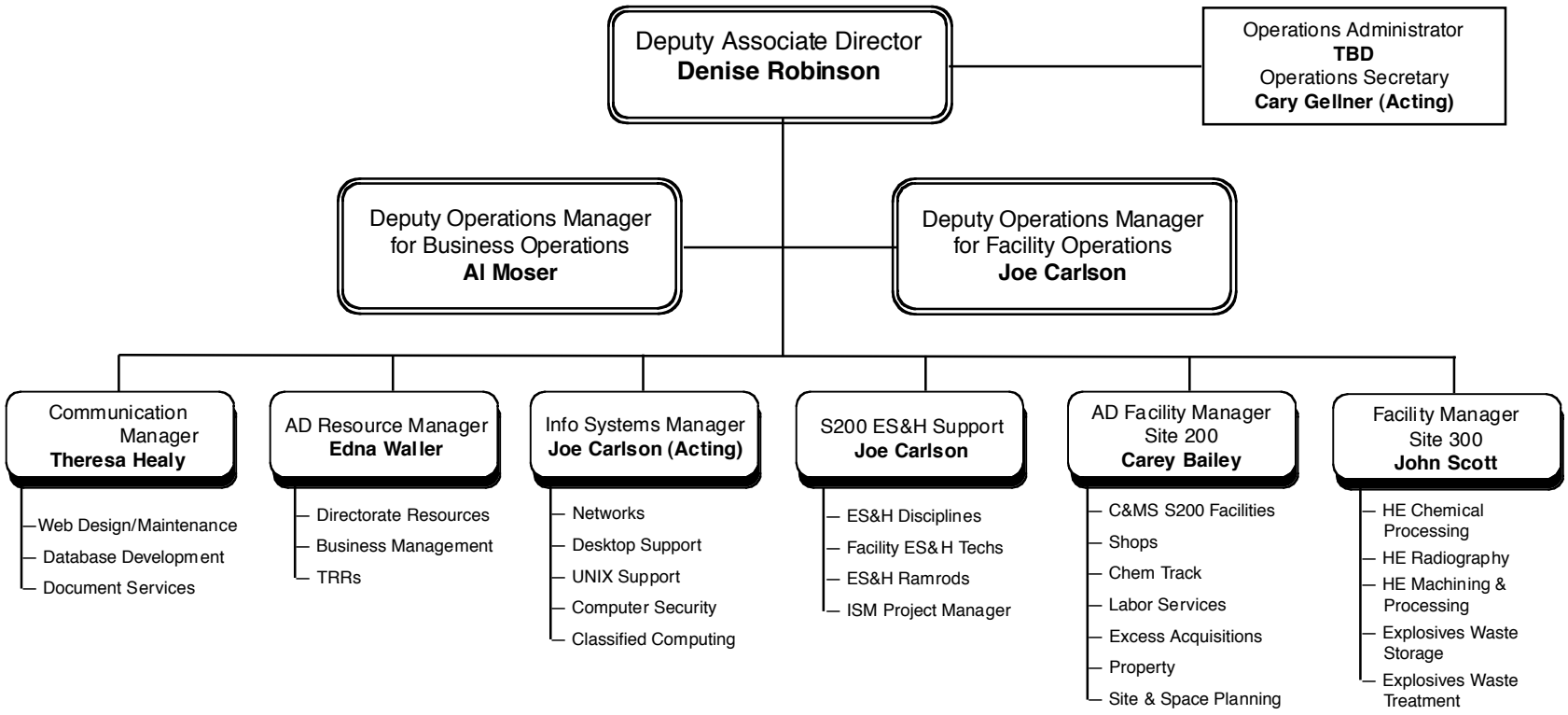
CMS Operations

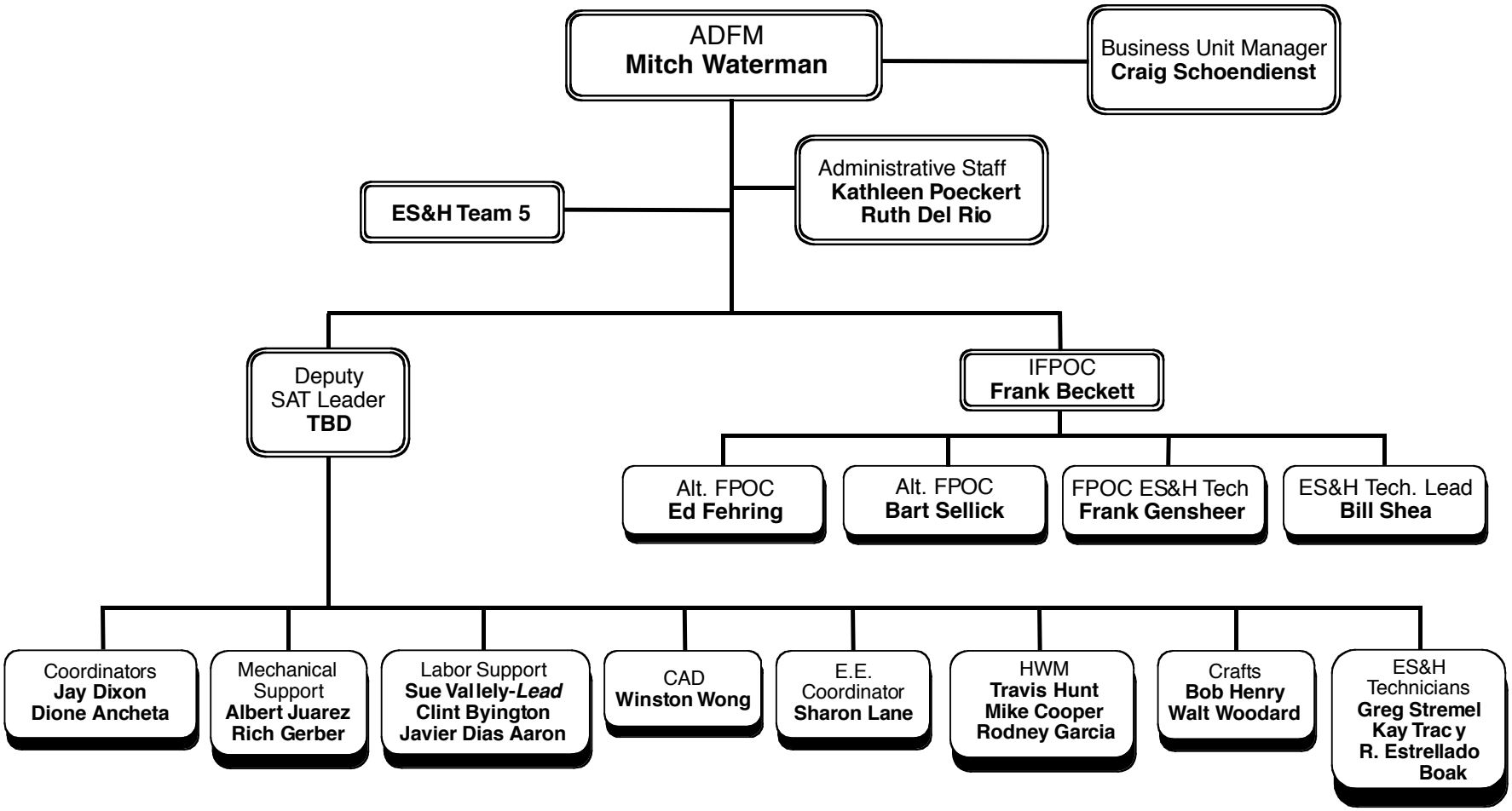


Matrixed Support Group Leaders

Comp	Kevin Leimoine
EE	Tony Lavietes/Mark LaChapell
ME	Moe Dehghani (Acting)/Steve Santor/Larry Walkley
HC S200	Steve Mcconnel
HC S300	Ross Wilson/Jerry Bardecker
Sec. Rep.	Dave Johnstone

Revised 1/25/01

Space Action Team (SAT)



Acronyms

AEC	Atomic Energy Commission
AD	Associate Director
ANCD	Analytical and Nuclear Chemistry Division
ASSSP	Actinide Sciences Summer School Program
BBRP	Biology and Biotechnology Research Program
BSSL	BioSecurity Support Laboratory
CAPS	Counterproliferation Analysis and Planning System
CMS	Chemistry and Materials Science
CChED	Chemistry and Chemical Engineering Division
CE	Capital equipment
CEES	Council for Energy and Environmental Systems
CES	Chemistry–Environmental Services
Comp	Computations
CVD	Chemical Vapor Deposition
CW/BW	Chemical Warfare/Biological Warfare
D&D	Decontamination and Demolition
DL	Division Leader
DMS	Division of Materials Science
DNT	Defense and Nuclear Technologies
DoD	Department of Defense
DOE	Department of Energy
DOE/DP	Department of Energy/Defense Program
DP	Defense Programs
DTSC	Department of Toxic Substances Control
E&E	Energy and Environment
EE	Electronic Engineering
ERD	Exploratory Research in the Disciplines
ES&H	Environmental Safety and Health/ Quality Assurance
EWSF	LLNL Explosive Waste Storage Facilities
EWTF	LLNL Explosive Waste Treatment Facilities
FSP	Facility Safety Procedure
FTEs	Full Time Equivalents
FY	Fiscal Year
G&A	General and Administrative
GPP	General Plant Project
GTS–ITS	Glenn T. Seaborg–Institute for Transactinium Science
HC	Hazards Control
HEs	High Explosives
HEAF	High Explosives Application Facility
ICF	Inertial Confinement Fusion
ICP	Inductively Coupled Plasma
IGPE	Institutional General Purpose Equipment
IS	Information System Support Team
ISMS	Integrated Safety Management System
ITS	(Glenn T. Seaborg) Institute for Transactinium Science
LDRD	Laboratory Directed Research and Development Program
LLNL	Lawrence Livermore National Laboratory
LW	Laboratory-wide
MAP	Materials Analytical Programs
MCAP	Materials Computational, Analysis, and Processing
ME	Mechanical Engineering
MPL	Materials Program Leader
MPO	Material s Program Office
MRI	Materials Research Institute
MSTD	Materials Science and Technology Division
NAI	Non-Proliferation, Arms Control, and International Security
NIF	National Ignition Facility
NTS	Nevada Test Site
OBES	Office of Basic Energy Sciences
OFC	Organizational Facility Charge
OPC	Organizational Personnel Charge
PDP	Planning, Development and Personnel
PMC	Program Management Charge
PPAC	Proliferation Prevention & Arms Control Program
PrHA	Process Hazards Analysis
Pu	Plutonium
PVD	Physical Vapor Deposition
PWP	Project Work Plan
R&D	Research and Development
RRP	Room Responsible Person
RTI	Returned to Institution
S200	Site 200 (Livermore Main Site)
S300	Site 300 (Livermore Explosives Testing Site)
S&Es	Scientists and Engineers
S&S	Safeguards and Security
S&T	Science and Technology
SAT	CMS Strategic Action Team
SI	Strategic Initiative
SSMP	Stockpile Stewardship Management Program
SST	Scientific Safety Team
TRACE	Transition Region and Coronal Explorer
TRR	Technical Release Representative
UC	University of California
UCB	University of California, Berkeley
WFDOE	Work for Department of Energy
WFO	Work for Others